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DIAGNOSTIC PALPATION OF THE VERMIFORM APPENDIX.[1]

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Nothing systematic has, to the writer's knowledge, as yet been published regarding diagnostic palpation of the vermiform appendix. The only conditions sought to be established by palpation have been either tenderness on pressure, or the presence of a tumor, or of fluctuation. The idea that the normal or slightly enlarged appendix can, as a rule, be recognized by the touch, previous to opening the abdomen, seems never to have been seriously entertained.

This *à priori* judgment upon the case is, however, founded upon fallacious lines of reasoning and is not at all consonant with the facts. The size of the appendix, its deep situation, and the character of the structures overlying it, have all been deemed insurmountable obstacles to its successful palpation. It is the writer's purpose, in this communication, to show how all these obstacles can be easily and successfully overcome.

The author's practical studies upon palpation of the appendix vermiformis extend back somewhat over a year. It may be added that practically all of his experience has been gained upon women, only three cases of appendicitis in the male having, during that time, come under his observation.

The following methods have been employed in the practical study of the subject:

1. Palpation of the appendix vermiformis in practically every woman whom the writer has had occasion to examine during the past year.

[1] Read before the Medical Society of the State of New York, Albany, February 7, 1894.

2. Critical palpation of the appendix in every case upon which cœliotomy for any purpose was contemplated, and, when practicable, comparison of the condition of the appendix, as ascertained at the cœliotomy, with that found at previous palpation.

3. Search for the appendix, during a cœliotomy, by palpation from without, and verification of the correctness or otherwise of the finding by the finger within the abdomen.

4. The establishment of the diagnosis, appendicitis, by palpation, with subsequent operation for removal of the appendix based upon the diagnosis thus made.

The practice of palpation of the vermiform appendix as a routine method in the examination of every woman has led to a recognition of the facility with which the appendix may, under ordinary circumstances, be palpated. Such palpation is best performed in the following manner: After completion of the ordinary bimanual examination of the pelvic organs, the woman is drawn upward upon the table to the extent of a foot or so, her feet still remaining where they were placed for the vaginal examination. This is done mainly for the purpose of unfolding the flexure of the thigh upon the abdomen and to render the right inguinal region more accessible to the palpating hand. One hand only, applied externally, is required for the practice of palpation of the vermiformis appendix. No assistance can be rendered by a finger introduced into the vagina, and very little assistance, and that only very occasionally, by a finger introduced into the rectum.

The examiner, standing at the patient's right, begins the search for the appendix by applying two, three, or four fingers of his right hand, palmar surface downward, almost flatly upon the abdomen, at or near the umbilicus. While now he draws the examining fingers over the abdomen, in a straight line from the umbilicus to the anterior superior spine of the right ilium, he notices successively the character of the various structures as they come beneath and escape from the fingers passing over them. *In doing this the pressure exerted must be deep enough to recognize distinctly, along the whole route traversed by the examining fingers, the resistant surfaces of the posterior abdominal wall and of the pelvic brim.* Only in this way can we positively feel the normal or the but slightly enlarged appendix; pressure short of this must necessarily fail.

It is just here that the analogy between the conditions necessary for a successful examination of the pelvic viscera, and those obtaining in a *correct* palpation of the appendix vermiformis, becomes apparent. A bimanual examination of the pelvic organs is the only one regarded as satisfactory at the present day; by a vaginal examination alone, or by an external examination alone, we are able to determine nothing of practical value. We need the fingers of one hand to afford a point of counter pressure to

enable the palpating finger or fingers of the other hand to recognize the structures they meet. Just so in palpation of the vermiform appendix. Here the firm posterior wall of the abdomen at this point, the iliac fossa, and the pelvic brim, form a good surface for counter pressure.

Palpation with pressure short of reaching the posterior wall fails to give us any information of value; the soft and yielding structures simply glide away from the approaching finger. When, however, these same structures are compressed between the posterior abdominal wall and the examining fingers they are recognized with a fair degree of distinctness. *Pressure deep enough to recognize distinctly the posterior abdominal wall, the pelvic brim, and the structures lying between them and the examining finger, forms the whole secret of success in the practice of palpation of the vermiform appendix.*

Proceeding in this manner, the appendix is recognized as a more or less flattened, ribbon-shaped structure when quite normal, or as a more or less rounded and firm organ, of varying diameter, when its walls have been thickened by past or present inflammation. When it is the seat of inflammatory changes the appendix vermiformis is always more or less sensitive on pressure; the normal appendix exhibits no special sensitiveness on being squeezed.

A good guide, in searching for the appendix, is formed by the right common and external iliac arteries, the pulsation of which can be easily and plainly felt. The line of these vessels corresponds to a surface line drawn from the left of the umbilicus to the middle of Poupart's ligament. The appendix is generally found almost immediately outside of these vessels. At its base it is separated from the vessels by a space of one-half to one inch, while lower down in its course it generally crosses very obliquely the line of the arteries.

Theoretically, two conditions mainly militate against the successful palpation of the appendix vermiformis after the method above described; practically, the difficulties offered by these two conditions amount to very little or nothing. I refer to the variable location of the appendix and to the fact of its common deep situation behind the cæcum.

With the very rare exceptions of its situation *far* away from its usual site, the origin of the appendix vermiformis is practically always found at what is known as McBurney's point. In fact, it is this constancy of the situation of the appendix which gives its practical value to McBurney's point in the diagnosis of appendicitis. The tenderness elicited by extremely localized pressure at McBurney's point is due to the presence beneath the finger of the inflamed appendix—a fact of which I have had abundant opportunity to satisfy myself.

The origin and first part of the appendix are practically, then, constant in situation, or so nearly so as not to interfere materially with the working rule: to first search for the appendix at McBurney's point. Any

deviations from its usual course, starting from this point, can be usually recognized by the examining fingers. Only that part of the appendix, however, situated above the level of the pelvic brim can be distinctly recognized by the finger. When the appendix in its course dips down into the pelvis, that part of it lying below the pelvic brim is recognized, if at all, only with great difficulty. The surface for counter pressure is lost below the iliac fossa.

The second condition commonly assumed to render successful palpation of the appendix vermiformis impracticable, if not impossible, is a time-honored, traditional myth. I refer to the assumed constant or common filling of the caput coli with fecal matter. In my own experience this condition is *very* rare; in fact, I cannot recall a case, during the period of over a year in which I have systematically practised palpation of the vermiform appendix, in which I have found it. In quite a number of emergency cœliotomies, in which no opportunity was afforded for previous catharsis, I do not recollect ever to have found a fecal impaction in the caput coli. Indeed, the systematic practice of palpation of the vermiform appendix, after the method described, gives us in addition a great deal of information about the cæcum. We generally find it empty, collapsed upon itself from before backward, with the inner and outer borders distinctly recognizable by the fingers as they pass over them. The appendix, being in the large majority of all cases situated behind the cæcum, is of course palpated *through* the apposed anterior and posterior walls of the caput coli.

The second manner in which the study of the subject has been pursued has been by especially careful and critical palpation of the appendix in every case in which a cœliotomy was contemplated. When feasible the appendix was again examined on the occasion of the cœliotomy, and its actual condition compared with that previously diagnosticated by palpation. With very rare exceptions, we found our previous diagnosis of the position and size of the appendix correct.

In five cases in which cœliotomy was undertaken upon other indications, a diseased appendix, previously diagnosticated as such by palpation, was removed at the same time. The operations combined with the ecphyadectomy in these cases were: salpingo-oöphorectomy for chronic salpingo-oöphoritis in the first; removal of two pus tubes in the second; salpingo-oöphorectomy and ventral fixation of the uterus, combined with plastic operations, for total prolapsus of uterus and vagina in the third; total extirpation of the uterus for fibromata in the fourth and fifth.

The third method of study, which has been pursued during the past two months only, has been found exceedingly satisfactory and instructive. After completing the intra-abdominal operation or operations for which a cœliotomy is undertaken, and before closing the abdomen, the appendix is located by palpation from without. While the palpating

finger presses the integuments down upon the appendix from without, thus marking its location as felt, and holding it down against the posterior abdominal wall, two fingers of the other hand are passed within the abdomen to verify or disprove the presence of the appendix immediately underneath the palpating outer finger. In the comparatively few tests thus made I have never failed to locate the appendix exactly and to diagnosticate correctly both its thickness and direction.

Finally, in a fourth series of three cases of chronic and one of acute appendicitis, the diagnosis was positively made by palpation, and cœliotomy was performed *solely* for the purpose of removing the diseased appendix. These four cases are additional to the five already mentioned when discussing the second method—in which the diseased appendix was removed as a secondary or additional measure when performing cœliotomy for other purposes. The acute and two of the chronic cases of appendicitis were successfully operated upon by myself. The third case I turned over to my colleague, Dr. G. F. Shrady, for operation, after making the diagnosis of chronic appendicitis by palpation.

In reference to this case Dr. Shrady writes (*Medical Record*, January 6, 1894, p. 2):

"In this connection I may state that my attention has been called by Dr. Edebohls to the possibility of diagnosticating recurrent appendicitis by actually feeling the appendix through the abdominal wall, and demonstrating the cause of tenderness by direct pressure upon the organ. In one case I was able to do this, to recognize the appendix rolling under the fingers, to limit tenderness to direct pressure upon the process, and afterward to remove the organ by operation from that exact locality."

And again (*ibid.*, p. 23) in summing up the discussion upon his paper:

"He had expected someone would question the diagnosis of the appendix by touch through the abdominal walls, for he had not supposed this possible until it had been suggested to him to make steady pressure until resistance was encountered from the posterior walls, when, if the appendix were present in that locality, it might be felt as a cord rolling under the finger. Probably this would be possible only where the appendix was turgid and bulbous, as it was in one case in which he mapped out its location, and on cutting down found it directly under the mark made on the abdominal wall, about two inches and a quarter from the anterior superior spine, in line with the umbilicus."

It needs but a fair, unprejudiced trial of the method of palpation of the appendix vermiformis as described to convince others, as Dr. Shrady has been convinced, that it is possible to diagnosticate chronic appendicitis by palpation. The members of the house staff of St. Francis' Hospital, who have worked with me during the past year have, by repeated practice, become expert in this method of examination.

It is within the memory of possibly each one of you that not ten years ago the man who claimed to be able, as a rule, to recognize and map out by bimanual examination the normal Fallopian tubes was looked

upon with suspicion. Where to-day is the gynecologist who cannot do this? And yet palpation of the appendix vermiformis, after a little practice, becomes quite as easy, if not easier, than palpation of the Fallopian tubes. Indeed, I would lay it down as an axiom that successful palpation of the appendix vermiformis, except in cases of acute appendicitis, is possible in all female patients in whom the absence of excessive stoutness, abnormal rigidity of abdominal walls, or other more exceptional unfavorable conditions, permit us to accurately define by bimanual palpation normal-sized Fallopian tubes.

The practical importance of palpation of the appendix vermiformis is apparent at a glance. Chronic appendicitis in the future is to be diagnosticated, not on subjective symptoms but on objective signs. Unless, in cases of suspected chronic appendicitis, the surgeon can recognize by palpation the thickened appendix, and limit tenderness on pressure to the diseased organ, he will not be justified in operating. A strict observance of this rule will prevent in future a not infrequent error of the past, that of performing a cœliotomy for appendicitis, only to find the appendix perfectly healthy.

One broad rule governing the question of operative interference in appendicitis should be: not to operate in chronic cases unless you can feel the diseased appendix, nor in acute cases unless by palpation you can recognize either the diseased appendix or the presence of a tumor. Anæsthesia may be necessary, in exceptional instances, to decide the question.

Palpation of the appendix vermiformis possesses practical importance in the *early stages* of acute appendicitis, at the time of operation, apart from its value as a diagnostic measure. In two instances in which I have operated early for acute appendicitis—in one on the second, in the other on the third day of illness—nothing but a small tumor could be felt in the right inguinal region before the patient was anæsthetized. After full anæsthesia, the inflamed, enlarged appendix could be distinctly felt in both cases. This enabled me to make the incision *directly over the diseased organ*, and thus to remove the strangulated appendix with greater facility and through a smaller opening than if the incision had been made farther away.

In conclusion I may remark that I have on two occasions forestalled an operation for supposed chronic appendicitis, proposed by eminent surgeons, by being able to recognize a normal appendix by palpation, and on this finding to advise against operation.

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URÆMIC HEMIPLEGIA.[1]

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It would seem that in view of the increasing number of reported cases of hemiplegia, which even a cursory search of medical literature discovers, where the paralysis subsequently completely disappears, that a careful study of uræmia as a causative factor should be undertaken. Yet we find that this condition has been denied by such authorities as Addison and Bright in England, and by Lécorché, Sée, and Lasègue in France. That such cases have existed and have been recognized, is evident, for in many cases the "serous apoplexy" of the older writers is capable of no other interpretation. Finlayson notes that hemiplegia may complicate pregnancy and pass away after labor, and that the urine is almost always albuminous. The stumbling-block to the appreciation of uræmia as a valid cause has been that we have a paralysis without an apparent lesion, a symptom *sine materia*. Yet the cases reported, even since 1880, by Charpentier, Pätsch, Jäckel, Raymond, Chantemesse and Tenneson, Bernard, Lancereaux, Level, Chauffard, Dreyfus-Brisac, Florand and Canniot, Lloyd, and Dercum, are not susceptible of other explanation. It has been demonstrated to exist by Leyden and Leichtenstern. The convincing papers of Massalongo in Italy in 1889 and Boinet in France in 1892 leave but little for complete conviction.

The physiology of this condition has been admirably shown by the experiments of Raymond, in 1885. On removing the left superior sympathetic ganglion of a rabbit, convulsions occurred in the right side of the body, which corresponds to the side of the brain in which the circulation was affected by the operation. Later the hilum of the kidney was ligated. On repeating the experiment with the right superior cervical sympathetic ganglia, the convulsions were limited to the left side of the body. On necropsy there was found in both instances a diffused bilateral cerebral œdema, the explanation apparently being that in excising this ganglion there occurs a vasomotor paralysis of the vessels of the head, the brain and its membranes, with vascular alterations. At the moment when the vessels have lost their tonicity, if the renal secretion be suppressed by ligation of the hilum, a dyscrasic cause is added to the lessened resistance of the hemispheres, and œdema will be more pronounced on this side, and here will be found the greatest effect of the uræmic intoxication. Or, in other words, the two halves of the nervous

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system under these conditions possess unequal powers of resistance, and the weaker yields.

The pathology, however, is not quite so evident as the preceding experiments would indicate; because, as it seems, our knowledge of the pathology of uræmia is by no means complete. That a bilateral diffuse œdema should result in unilateral paralysis, is in many cases difficult of belief; and, as Dercum has pointed out, there may be no more œdema on one side of the brain than upon the other. In the cases of Leichtenstern and Charpentier, however, the œdema was accurately localized. Then, again, as in cases of Level, Chauffard and Lancereaux, and of Lloyd, there may be no œdema found on necropsy. Or, if the œdema is found, it may not exist where it is expected, as in a case reported by Charpentier, where it was on the side of the brain opposite to the one which would account for the paralysis. However, Lancereaux has found both cerebral œdema and as well ventricular dropsy. Massalongo points out the resemblance of this paralysis to that caused by other general intoxications, as of lead, carbonic dioxide, carbon bisulphide, arsenic, and mercury, as evidence that a general cause may produce a localized paralysis. Indeed, the evidence is present that a diffuse, symmetrical œdema may be the cause of unilateral, asymmetrical paralysis. In diabetes we may seek further for an analogy (the cerebral dehydration of Bouchard), and finally in the auto-intoxicants, as acetonæmia, hypoglycæmia, oxybutyricacidæmia, may the complete explanation be found. If hemiplegia be not exclusively dependent upon cerebral œdema, we are obliged to admit the action of toxic urinary products and ptomaïnes upon the nerve centres. In spite of all this, we believe that the case of Dreyfus-Brisac is a strong argument in favor of a theory which gives to serous œdema a firm position in the pathology of uræmic manifestation. The localization or greater intensity of circulatory troubles in the brain may be explained by the analogues of the sudden œdema of eyelids or errant foyers of pulmonary congestion, by no means uncommon in patients suffering from uræmia. In the cases of Boinet and Jäckel the hemiplegia with hysteriform anæsthesia could only be explained by a sudden fugitive and temporary œdema of the brain which predominated in the cortical motor zone of the left hemisphere. Raymond sums up by stating that the cerebral circulatory troubles may be congestion or anæmia, but in their last analysis it is an *anoxyhemie* of the brain. Raymond believed that atheroma was the connecting-link between uræmia and localized paralysis. However, Chantemesse reported three cases in which no lesion of the vessels was found, one of them at the age of thirty-five, and Lloyd's case was only seventeen, and this has also been noticed by Chauffard and by Level. The heart has been found to be slightly hypertrophied by Pätsch, who remarked in both of his cases arterio-capillary fibrosis. The kidneys

show interstitial nephritis (Lloyd's case, seventeen years old, a chronic sot, the pig-backed kidney), or chronic parenchymatous nephritis with atrophy (Pätsch).

The clinical histories of the reported cases present great uniformity of symptoms and signs. Careful questioning is important that the existence of prodromal symptoms shall be clearly established, for upon the presence of these symptoms (and they are rarely absent) is placed great dependence in the diagnosis.

As symptoms:

1st. Vertigo, often slight.

2d. Gastric symptoms, nausea unrelieved by stomachic medication, vomiting apparently without cause.

3d. Cardiac: if it be isolated hypertrophy of left ventricle, it should be remembered that this predisposes as well to cerebral hemorrhage.

4th. Localized œdema of face, eyelids, patches in lungs.

As signs:

1st. The urine is likely to be albuminous before the hemiplegia appears. If it is only discovered afterward this symptom loses much of its significance, for it is often found in hemiplegia from hemorrhage or softening.

2d. Persistent low specific gravity of the urine is important, and casts, if found, will do much to aid in forming an opinion.

3d. If only hyaline casts are present, the general import of the urinary findings is increased, for in contracted kidney these may be the only casts present.

4th. If atheromatous changes are apparent, it may be suspected that the cerebral arteries present the same changes.

5th. If albuminuric retinitis is present, as is rarely found, there is great probability that this is the origin of the hemiplegia.

The cardinal symptom of the attack itself is the sudden attack of hemiplegia, which may or may not be complete. The patient frequently, although not always, becomes comatose, with stertorous respiration. As the patient comes out of the condition the paralysis may be markedly relieved, or it may persist for several days with the same intensity. It may even change sides, as Lancereaux has observed. It may be followed by contractions which are localized in the adductors of the opposite thigh, or in the non-paralyzed arm as was seen by Raymond. The accompanying facial paralysis is of central origin and involves only the inferior facial, and is of the side corresponding to that of the body in five cases reported by Jäckel, Raymond, and Chantemesse. In the three cases of Bernard, Raymond, and Level, the face was not involved. Ptosis is exceptional, a single case of Raymond being the only one hitherto recorded. The morning hemiplegia may be complete, but it may be relieved and may disappear by evening. Aphasia has been

observed in six cases (Level, Bernard, Raymond, and Lancereaux) coinciding with right hemiplegia. The hemi-anæsthesia is presumably of cortical origin, often less complete and more transitory than the motor paralysis. It may be sensorial, as in Raymond's case and in Boinet's (deafness), or it may invade the entire surface of the body (Raymond). It is usually proportionate to the loss of power. If coma is marked there may be a relaxation of all the members and the hemiplegia may be ascertained only as consciousness is restored. At the onset convulsive phenomena are frequent, a hemi-epilepsy or a hemi-eclampsia, especially in the part which later becomes paralyzed. Jacksonian epilepsy, if present, is important in diagnosis. Conjugate deviation of the head and eyes is not uncommon. Generally the deep reflexes are diminished or abolished, but rarely are they exaggerated. Superficial reflexes are usually impaired. The pulse may be small, but is not likely to be hard or slow. The temperature was elevated in Chantemesse and Tenneson's cases even to 104° F. Unilateral deafness has been described by Bright and Barlow, Addison, Lasègue, Routh and Goeles, Dieulafoy, Tissot, Dommergue, and Gurnowitch, and which persisted several weeks. In Boinet's case this deafness lasted three weeks. For five days an amnesis, similar to that which follows eclampsia and carbon dioxide intoxication, persisted in Boinet's case. The pupils are not usually contracted (they were not contracted in Boinet's case); but if they are, hemorrhage and softening are not excluded.

SEQUELÆ.—The motor troubles disappear, the sensory conditions return, and recent contractures are rare—equally so are late ones. The tendon reflexes of the disabled side may become normal, or, as in my case, exaggerated.

The differential diagnosis is important, but, as was shown by Florand and Canniot in one case, it may be impossible. The hemiplegia from cerebral hemorrhage presents many points of similarity. The distinction can be made in that it is apt to cease after the coma, and that it rarely persists for several days with great severity; after a time the uræmic hemiplegia disappears in part or as a whole. Or if another uræmic attack supervenes, the paralysis may be upon the same or the opposite side, nor is it so complete or permanent as in cerebral hemorrhage. The important characteristics are the antecedents of the person, the variability and mobility of the paralysis, the presence of albumin, and the low specific gravity of the urine. There is nothing distinctive about the coma or the slow and stertorous breathing. The paralysis in both instances may be preceded by unilateral convulsions resembling those of an irritative lesion of the psycho-motor zone of Jackson, Bravais, and Charcot. These convulsions may be clonic, rhythmical, often limited to members which later become attacked by paralysis, or they may be both clonic and tonic at the same time. Leichtenstern

attributes these convulsions to localized œdema. Rigidity of limbs or local muscular twitching in paralyzed limbs is in favor of uræmia.

Although both Addison and Lasègue deny the existence of a distinctive uræmic temperature, yet the low temperature so frequently found is a help in diagnosis. Gowers says that in uræmia the temperature is always subnormal except when local influences exist. Yet we do not obtain the profound alterations in temperature which have been so carefully described by Dana—the marked initial fall, the gradual rise of the first three or four days to normal or slightly beyond—nor indeed the slightly higher (one-half to two degrees) temperature in the paralyzed side, nor is it normal on the paralyzed, the subnormal being on the sound side. Perspiration is more likely to be present in cerebral hemorrhage. Nor are we so likely to have the abundant urine of low specific gravity in uræmia, while albumin and casts are far more frequent. The condition of the deep reflexes, abolished immediately after shock, soon returning and becoming exaggerated on the paralyzed side, may be alike in both instances. But there is not so likely to be inequality in the size of the pupils as in hemiplegia from hemorrhage, nor so great failure to respond to light. If the pupils are normal or dilated we should consider uræmia. But on the other hand we must remember that renal disease is found in one-third of all cases of cerebral hemorrhage (Eskridge), and it should also be borne in mind that the hemorrhage may be due to syphilis.

The mobility of the paralysis recalls that due to cerebral softening from thrombosis—complete in the morning, it diminishes in the evening and again increases some hours after. Myosis is not a valuable sign, as it occurs in both. Aphasia in right-sided paralysis has only a negative value. The temperature, if elevated, may be due to local conditions in uræmia. If lowered, it points toward uræmia, but not so strongly as against hemorrhage, for according to Dana, the initial fall in softening from thrombosis or embolism is rare, and if the temperature be taken in the rectum it is of short duration. If subnormal temperature exists it is only in the non-paralyzed side, and there is a slighter tendency to irregularity in both sides and a slower rise if it does occur. But if secondary inflammatory symptoms occur the temperature is well marked (Eskridge), and so this fact would be against uræmia. The urine may also be albuminous, but is not so likely to contain casts as in uræmia. The condition of the heart, which is likely to be feeble, dilated, and irregular, may aid in the diagnosis of softening; the arterial degenerations are common in both.

It does not seem necessary that the differential diagnosis between uræmic hemiplegia and tubercular meningitis or hysteria or epilepsy should be given, as the mistake ought not to be made, but as writers have called attention to these conditions it is well to bear them in mind.

In general, the fugitive premonitory symptoms, localized œdema, pallor, headache, dyspepsia, the variability and mobility of the paralysis, which may or may not be preceded by Jacksonian epilepsy, the urinary conditions, the temperature curve, and finally the complete cure, suffice for a clearly cut diagnosis.

The prognosis is generally very grave, naturally depending chiefly upon the renal lesion. An elevation of temperature to 104° F. is always of unfavorable portent. In Boinet's case it remained normal; in Chantemesse's case, which recovered, it never rose above 100.4° F. Myosis and conjugate deviation of eyes and head are of grave omen. In the majority of cases of death these three symptoms have been present. The amelioration of the uræmia marks the decline of the hemiplegia. So far as the hemiplegia itself is concerned, total recovery is the rule.

TREATMENT.—If the general condition permits, bleed (Boinet's case to 400 grammes, which caused the coma and hemiplegia to disappear). This takes out urea in the proportion of 2.43 per mille, with toxic urinary products and ptomaïnes, and as well relieves the vascular troubles and cerebral œdema which Raymond, Chantemesse, Florand, and Canniot have habitually found in autopsy. Drastic purgatives may be useful: elaterin, jalap with cream of tartar, croton oil in emergency; or purgative clysters, concentrated glycerin, Epsom salt enema. Diuretics may be indicated, as theobromine; and diaphoretics, as pilocarpine, if the heart be carefully watched. Digitalis has been recommended if the stomach bears it, but preferable is strophanthus or sparteine. Adonidine as a substitute should be borne in mind. Milk for nourishment should be insisted upon. Steam baths are occasionally of use. For convulsions bromide of potassium and chloral are indicated.

In the following case the diagnosis of uræmic hemiplegia was made:

J. M. W., of New York, aged seventy-five years, bachelor, living at leisure, of Scotch ancestry, had always enjoyed good health. His parents died at an advanced age, and an only sister of epithelioma late in life. In the spring of 1892, while descending a stairway in a hotel, he became dizzy, fell, and was taken to a hospital while unconscious, in an ambulance. He recovered within a few hours and was able to return unaided to his home a few blocks distant. While in the hospital, a house physician with more medical ardor than notions of cleanliness, drew off his urine with a catheter. As a result he suffered from a severe attack of cystitis which was treated by several surgeons—internal treatment, washing out of the bladder—with indifferent success. The summer was spent at Saratoga, where his general health improved, but the condition of the bladder remained stationary. During the fall the cystitis was cured, and beyond an occasional single call to urinate at night, he suffered no inconvenience. When the pus, epithelium, and bacteria had been removed from his urine, analysis showed that the amount varied from forty to forty-five ounces in the twenty-four hours, was always of light color, transparent, of normal odor, specific gravity 1012–1016. It never con-

tained albumin nor sugar, and very rarely a slight indication of bile. The urea was generally diminished; occasionally the uric acid was increased, but as a rule there was diminution of both the alkaline and earthy phosphates, and of the chlorides. The sediment consisted almost entirely of a few stray epithelial cells, chiefly from the bladder, and a few leucocytes. Although not in good flesh, he had fine color, was able to walk without fatigue, and in general considered himself well. He did not use nor had he ever used alcohol in any form; he indulged sparingly in tobacco. There was no *arcus senilis*, no pulmonary signs beyond a slightly roughened respiration in mid-chest. His pulse was of fair breadth but of increased tension, yet compressible, generally of the rate of 66 to 70; the aortic second sound was accentuated, and the first sound, somewhat shortened, was loud and rather metallic in quality. He was able to read his newspaper with a convex glass of only three-quarters of a dioptre. There were no visual or dyspeptic symptoms, no œdema nor other urinary symptom. At his dinner on the evening of January 24th he partook of a considerable quantity of indigestible food. He was found by his valet early in the morning of the following day, unconscious; I saw him a few hours later. He had passed urine in bed involuntarily. The body surface was dry, the skin was cool to the touch; with the exception of the upper right arm the muscles of the entire left side of the body were flaccid. The upper arm extensors and flexors were alternately contracting, which kept the arm in slow motion in an arc of six to eight inches, the contraction of the deltoid carrying it slightly outward. The deep reflexes were absent on both sides; the skin reflexes difficult to obtain. Pricking with the sharp point of a Carroll's æsthesiometer was not followed by contraction. The pupils were in mid-dilatation, but responsive to light, no strabismus nor deviation; the left side of the face was flaccid, with ptosis of left eyelid; left angle of mouth was moving with the stertorous respiration and the saliva freely pouring from the angle. On speaking loudly he became sufficiently conscious to partially protrude his tongue, which deviated to the left. He did not, however, open his eyes, although the right was slightly open. The respiration was 19, stertorous; temperature 97.3° in both axillæ. During the day the motion of the left upper arm ceased; consciousness was partially re-established, when it was found that swallowing was possible, although with some difficulty, and the temperature rose to 99.1° by night, and was then, as it proved to be throughout his entire illness, the same in both axillæ. During the afternoon the patient became confused and flighty, and late in the evening was bathed in warm perspiration.

Examination of urine. Quantity, 16 ounces; specific gravity, 1012; reaction, acid; color, pale; odor, normal; cloudy; appearance of sediment, flocculent; albumin, ½ of 1 per cent. by weight; sugar, absent; bile, trace; blood, none; casts, few hyaline casts; pus, none; bladder epithelium.

January 26. Pulse 66, of the same character; respiration and temperature as at night; had spent a somewhat restless night, but yet slept at intervals. The paralysis of the face was much less marked; articulation was fairly distinct, but the deviation of the tongue was pronounced. The paralysis of the left side of the body was marked; no evidence of motion, even on puncture, excepting a fibrillary twitching of the upper arm muscles. Superficial (skin) reflexes exaggerated, and both tendon reflexes were obtained with difficulty. The temperature rose half a

degree during the day, and at night the paralysis of the body was still profound.

Examination of urine. Quantity, 33 ounces; specific gravity, 1014; reaction, acid; color, pale; odor, normal; cloudy; appearance of sediment, flocculent; albumin, ¼ of 1 per cent. by weight; sugar, none; bile, slight amount; phosphates, increased; casts, a very few hyaline; bladder epithelium.

27*th.* The paralysis became very much worse during the night, so pressure could not be made by the left hand. The patient was irritable, but could speak with considerable distinctness; the temperature was 99°; pulse 70, of less tension and quicker; respiration 20. The pupils are now of normal size, responsive to light. The skin is moist, and besides a slight drooping of the left angle of the mouth, there is little to be seen; the ptosis has disappeared. In the evening the facial paralysis was relieved to a slight extent, that of the body being less marked. No evening elevation of temperature.

Examination of urine. Quantity, 35 ounces; specific gravity, 1014; reaction, acid; color, yellow; odor, normal; slightly cloudy; appearance of sediment, flocculent; albumin, ¼ of 1 per cent. by weight; sugar, absent; bile, absent; phosphates, normal; casts, very few hyaline and some finely granular; bladder epithelium.

28*th.* Without other change in the general condition, the paralysis of the leg appeared to be much more marked, and the tendon reflex of both sides was normal. Temperature 98.8°; pulse as before. Dynamometer: right 37, left 11. Paralysis less marked in the evening.

Examination of urine. Quantity, 34 ounces; specific gravity, 1010; reaction, acid; color, yellow; odor, normal; clear; appearance of sediment, slightly flocculent; albumin, ¼ of 1 per cent. by weight; sugar, none; bile, none; phosphates, normal; casts, very few hyaline; epithelium, few bladder cells.

29*th.* The paralysis of face has entirely disappeared; the tongue-tip on protrusion is almost in the middle line; the intellectual faculties as before the illness, with the addition of considerable impatience. The tendon reflex of left side is exaggerated, that of the right normal. Dynamometer: right 37, left 14. The paralysis of the leg has markedly improved, that of the arm less so. In the afternoon the usual progressive gain of power.

Examination of urine. Quantity, 36 ounces; specific gravity, 1015; reaction, acid; color, pale yellow; clear; appearance of sediment, slightly flocculent; albumin, ¼ of 1 per cent. by weight; sugar, none; bile, none; casts, none found; epithelium, bladder cells.

30*th.* This morning the temperature is normal, and the patient appears brighter; the knee-jerk on left side more active; right, normal; paralysis is less marked than yesterday; sleep has been fair. In the evening the paralysis is somewhat better.

Examination of urine. Quantity, 39 ounces; specific gravity, 1012; reaction, acid; color, pale; clear; appearance of sediment, slightly flocculent; albumin, ¼ of 1 per cent. by weight; sugar, none; bile, none; uric acid, diminished; casts, none; epithelium, few bladder cells.

31*st.* A marked improvement in all symptoms. Dynamometer: right 38, left 19. Superficial reflexes normal; tendon reflexes as before. Evening improvement slight. The temperature, respiration, and pulse normal.

Examination of urine. Quantity, 36 ounces; specific gravity, 1014; reaction, acid; color, pale; clear; appearance of sediment, slightly flocculent; albumin, $\frac{1}{8}$ of 1 per cent. by weight; sugar, none; bile, none; casts, none; epithelium, few bladder cells.

February 1. But little change, and that in the line of improvement. Pulse is 66, broader, and tension less marked.

Examination of urine. Quantity, 45 ounces; specific gravity, 1015; reaction, acid; color, pale; odor, normal; clear; appearance of sediment, slightly flocculent; albumin, $\frac{1}{8}$ of 1 per cent. by weight; sugar, none; bile, none; casts, none; slight amount of bladder epithelium.

2*d*. Steadily improving.

Examination of urine. Quantity, 47 ounces; specific gravity, 1016; reaction, acid; color, pale; odor, normal; clear; appearance of sediment, slightly flocculent; albumin, $\frac{1}{8}$ of 1 per cent. by weight; sugar, none; bile, none; casts, none; slight amount of bladder epithelium.

4*th*. Dynamometer: right 37, left 26; paralysis slight both morning and evening; upper arm and leg muscles but little affected; finer motions of hand are difficult, resulting in much trembling.

Examination of urine. Quantity, 49 ounces; specific gravity, 1012; reaction, acid; color, pale; odor, normal; clear; appearance of sediment, slightly flocculent; albumin, trace; sugar, none; bile, none; uric acid, normal; casts, none; small amount of bladder epithelium.

6*th*. Sits up in chair; but little trace of illness, excepting pallor and slight loss of power in left hand.

Examination of urine. Quantity, 51 ounces; specific gravity, 1017; reaction, acid; color, slightly pale; odor, normal; clear; appearance of sediment, slightly flocculent; albumin, trace; sugar, none; bile, none; urea, normal; uric acid, normal; chlorides, normal; casts, none; bladder epithelium.

9*th*. Patient is steadily improving.

Examination of urine. Quantity, 53 ounces; specific gravity, 1013; reaction, acid; color, slightly pale; odor, normal; clear; appearance of sediment, slightly flocculent; albumin, none; sugar, none; bile, none; urea, diminished; uric acid, normal; chlorides, normal; phosphates, slightly diminished; casts, none; small amount of bladder epithelium.

21*st*. Walks with aid of attendant; left foot drags slightly, although he can stand alone. Urine now as before illness. Appetite good and sleep undisturbed but once for urination. General appearance good.

The treatment in this case consisted in a preliminary purgation with $\frac{1}{8}$-grain doses of elaterin, repeated every two hours until free evacuation of the bowels was obtained. Nitroglycerin, $\frac{1}{100}$ grain, or the nitrate of soda, 1 to 2 grains, with sulphate of sparteine, $\frac{1}{4}$ grain, and the sodio-benzoate of caffeine, 2 to 5 grains, was administered according to the indications as found in the heart and kidneys. During convalescence, the phosphate, 40 grains, and bicarbonate of soda, 15 grains, was given in a glass of hot water on rising in the morning, and $\frac{1}{20}$ of a grain of nitrate of strychnine before each meal.

Within two months the only indication of the illness through which he had passed was a slight exaggeration of the tendon reflex of the left (formerly paralyzed) leg.

CONCLUSIONS.—1. Uræmic hemiplegia is a distinct form and should be recognized as such.

2. The peculiarities are its mobility, variability, and complete recovery.

3. The diagnosis rests upon antecedent history, condition of the urine, and temperature curves.

4. The dominating factor in treatment is the uræmia.

706 MADISON AVENUE.

THE EFFECT OF MASSAGE ON THE NUMBER AND HÆMOGLOBIN VALUE OF THE RED BLOOD-CELLS.

BY JOHN K. MITCHELL, M.D.,
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DURING several years past, while using massage a great deal in various diseases, I have often wished to find some additional way of accounting for the rapid improvement of color and nutrition which is seen under its application in patients anæmic from various causes, rather than the usual vague suggestion of hastened circulation and accelerated tissue change.

In pursuit of this object, in the autumn of 1893 I made some examinations of the blood of patients before and after massage. The first results were so astonishing that I reported them briefly to the College of Physicians of Philadelphia, in December last, and proceeded to a wider and more systematic study. The sum of the conclusions drawn from this extended observation is here presented.

After this investigation was begun I found a paper by Professor Winternitz,[1] which had previously escaped my notice, on the change in the number of red and white blood-corpuscles under hydrotherapeutic procedures. The article was interesting and suggestive, but did not take up the detailed examination of blood before and after massage.

In a "Preliminary Note" in the *Medical News* of December 23d, a brief account was given of a few of these studies upon the effect of massage as evidenced in the blood. The facts are so remarkable, the clinical conclusions which may be drawn from them of such widespread use and value, and the deductions which at once suggest themselves so revolutionary, so subversive of established views both in diagnosis and therapeusis, that the work has necessarily extended itself far beyond the limits originally proposed. I shall endeavor here to summarize the experiments made, to indicate the more important information acquired

[1] "Neue Untersuchungen ü. Blutveränderungen nach thermischen Eingriffen." Centralblatt f. inn. Medicin, 1893, No. 49.

from them, the far-reaching possibilities which are hinted at in some of them, and the questions in the physiology and pathology of the blood which they suggest.

The cases were thirty-five in number; several of them were examined a number of times, but, in order to exclude as far as possible the element of different individual susceptibility to the treatment, few were used more than twice. The diseases from which they were suffering included every variety of disorder affecting the integrity of the blood, except the severe acute fevers and malignant infections: simple anæmia, both slight and severe, chlorosis, anæmia from hemorrhage, from several toxic causes, from senile and other malnutritions, and at least one case in which the diagnosis of pernicious anæmia had been made by competent observers. This diagnosis was partially verified by the death of the patient without other symptoms than those of progressive anæmia,[1] although no post-mortem examination was obtained. Another case of very extreme anæmia, at first thought to be of pernicious nature, is still under observation, and at present much improved. A number of trials were also made on persons in whom there was no evident anæmia, and several on individuals in perfect health.

As will be seen from the examination of the tables, the results were uniformly upon the side of increase, except in three cases. The increase in some was very small, but the *tendency* seems always to have been in that direction. In two of the three persons whose count was lessened after massage, active exercise had been taken just previous to the count. One had walked about two miles and a half before the examination, upon a very cold day, in the teeth of the wind; the other had walked half a mile to a country station, come ten miles in the train, and then walked half a mile in town again immediately preceding the examination. In both of these there was marked diminution of the number of red globules after the application of massage, but these cases cannot be considered as contradictory of the results obtained in disease. They had already a greatly increased activity of circulation, and the rest as well as the rubbing had a share in the reduction. The third (Case VII.), by a nurse's mistake received his dinner after the completion of his massage and before the count was begun, which may have interfered with the full and usual effects of the manipulation. Previous and subsequent estimations gave decided increase.

It should be added that great care was used in ascertaining the relation to meals of the hour of examination, as it is well recognized that the corpuscles are increased during the active process of digestion, and, where the time was near a meal, the fact is mentioned in the tables.

[1] Dr. John H. Musser, in whose care this patient was, states that he would prefer to make a diagnosis of "severe anæmia from atrophy of the gastric mucous membrane," as the reduction of the corpuscular elements was not very great.

Effect of Massage upon the Blood.

Case.	Observation	Age.	Sex.	Disease.	Before massage.			After massage.			Remarks.
					Red blood-corpuscles.	White blood-corpusc.	Hæmoglobin-value.	Red blood-corpuscles.	White blood-corpusc.	Hæmoglobin-value.	
I.	1	25	M.	Healthy	5,675,000	.....	110	7,950,000	.....	120	Hospital interne.
	2	...	...	Same subject	5,650,000	.....	110	8,125,000	.....	120	" "
II.	3	26	M.	Healthy	6,650,000 6,800,000	.....	110	5,150,000	.....	110	Count made after a sharp walk on a cold day.
III.	4	25	F.	Subacute rheumatism	7,100,000	15,000	80	8,012,500	25,000	80	Negro servant.
IV.	5	43	F.	Sciatic neuritis	6,800,000	.....	85	7,000,000	.....	85	Physician; rest treatment for sciatica.
V.	6	45	F.	Hemiplegia (attack 18 days previous)	5,925,000	.....	64[1]	6,640,000	.....	70[1]	Half-hour's massage.
	7	...	...	Same subject	5,580,000	.....	62[1]	8,133,333	.....	70[1]	One hour's massage.
	8	...	...	" "	4,600,000	.....	74[1]	6,220,000	.....	78[1]	*See also* Obs. 50–57.
	9	...	...	" "	5,425,000	.....	.....	5,600,000	.....	.....	
	10	...	...	" "	5,012,500	12,500	65	6,675,000	12,500	75	
	11	...	...	" "	5,187,500	.....	65	8,800,000	.....	70	
VI.	12	38	F.	Neurasthenia, chronic gastritis	4,660,000	.....	.....	5,866,660	.....	.....	
VII.	13	53	M.	Hemiplegia (attack 10 weeks prev.)	5,050,250	.....	70	6,725,000	.....	75	
	14	...	...	Same subject	5,122,500	.....	65	7,240,000	.....	67	
	15	...	...	" "	5,000,000	12,500	70	4,540,000	12,500	70	By a nurse's mistake received dinner after massage and before last count was made.
VIII.	16	16	M.	Transverse myelitis (recovering)	6,300,000	.....	90	8,100,000	.....	100	Several months in hospital under massage and good diet.
IX.	17	22	M.	Locomotor ataxia (doubtful)	6,575,000	.....	110	7,340,000	.....	110	Same as above.
X.	18	16	M.	Anterior poliomyelitis (improving)	6,200,000	.....	110	7,400,000	.....	110	" "
XI.	19	37	F.	Hysterical delusions, mild melancholia.	5,400,000	.....	80	5,460,000	.....	80	Had been 4 weeks under rest, massage, and full feeding when examined.
XII.	20	40	F.	Neurasthenia	5,150,000	.....	75	5,600,000	.....	75	
XIII.	21	...	F.	"	5,150,000	.....	70	5,500,000	.....	70	Appearance highly anæmic; massage three quarters of an hour.
XIV.	22	22	F.	Simple anæmia	4,275,000	.....	70	5,450,000	....	70	Four weeks' rest, massage, and full feeding.
XV.	23	33	F.	" "	4,550,000	.....	60	5,100,000	.....	60	
XVI.	24	30	F.	Hysterical torticollis	5,900,000	.....	75	6,750,000	.....	90	Appearance highly anæmic.
XVII.	25	25	F.	Neurasthenia, dysmenorrhœa	3,637,500	.....	55	6,025,000	.....	60	
XVIII.	26	63	M.	Convalescent from epidemic influenza.	4,550,000	.....	70	6,400,000	.....	85	Temp. before, $99^{2}/_{5}$° F. " after, $99^{4}/_{5}$° massage 70 minutes.
XIX.	27	18	F.	Hysteria, general symptoms	4,150,000	.....	90	3,300,000	.....	100	Had walked to railroad station and travelled ten miles to town immediately before count.

[1] Hæmoglobin was estimated by Gowers' instrument.

XX.	28	40	F.	Severe anæmia, January 11, 1894 .	1,650,000	.....	18	.....	.....	.....	Before all treatment.
	29	...	...	January 13, 1894 .	1,500,000	1,250	18	1,650,000	12,388	30	Blood showed, poikilocytosis, megaloblasts, microcytes, and on staining, nucleated red corpuscles.
	30	...	...	Jan. 24th, after one week's massage daily.	3,800,000	.....	35	5,400,000	.....	35	Menstruation on January 14th.
	31	...	...	Jan. 31st, no massage for four days, no medicine.	5,550,000	.....	50	.....	.....	.....	
	32	...	...	Feb. 1st, five days without treatment	5,900,000	.....	60	.....	.....	.....	The increase at this time was so great from day to day that no further counts were made.
	33	...	...	March 31st	4,800,000	.....	50	.....	.....	.....	Patient was operated for hemorrhoids, losing some blood. No treatment for 12 days after.
XXI.	34	...	F.	Severe anæmia, 8 years' duration .	1,350,000	.....	85	1,500,000	.....	90	Counted on fifteenth day from operation.
XXII.	35	50	F.	Doubtful posterior sclerosis and high-grade anæmia.							
				August 1, 1893 . .	581,000	.....	.....	.....	.....	.....	
				September 1, " . .	950,000	.....	.....	.....	.....	.....	Duodenal ulcer was suspected from pain and other symptoms; no bleeding.
				October 18, " . .	1,628,000	.....	.....	.....	.....	.....	
	36	...	...	January 16, 1894 . .	934,664	.....	15	.....	.....	.....	Poikilo-, micro-, and megalocytosis. On account
	37	...	...	January 18, " . .	825,000	.....	12	940,000	.....	12	of the suspicion of ulcer massage of the abdo-
	38	...	...	January 25, " . .	987,500	.....	22	1,450,000	.....	27	men was omitted. *See also* Obs. 62.
XXIII.	39	64	F.	Pernicious anæmia or anæmia from atrophy of gastric mucous membrane.							
				December 1st . . .	2,250,000	.....	56	.....	.....	.....	Emaciated and cachetic; too feeble for full massage; rubbed thirty to thirty-five minutes.
	40	...	...	" 28th . . .	2,600,000	.....	.....	4 666,666	.....	.....	
	41	...	...	" 29th . . .	2,225,000	.....	.....	2,775,000	.....	.....	No white blood-corpuscles could be found.
	42	...	...	" 30th . . .	2,600,000	.....	.....	3,200,000	.....	.....	Patient died Dec. 31; no autopsy obtainable.
XXIV.	43	52	M.	Toxic anæmia, chron. lead-poisoning	3,725,000	.....	30	.....	.....	.....	Counted by different observers on three successive days at same hour.
	44	...	...	.....	3,900,000	.....	30	.....	.....	.....	
	45	...	...	.....	4,000,000	.....	30	4,500,000	.....	30	Abdominal massage for twenty-five minutes.
	46	...	...	.....	4,000,000	.....	30	6,500,000	.....	30	General massage one hour
XXV.	47	26	M.	Toxic anæmia, chronic lead-poisoning.	5,100,000	.....	100	5,925,000	.....	100	Effleurage (forty minutes) was the only form of massage used.
XXVI.	48	40	F.	Malarial poisoning, choreic spasm of facial muscles.	4,700,000	78,333	70	7,100,000	184,210	70	White blood-corpuscles 1 : 60 before. " " " 1 : 38 after.
XXVII.	49	60	M.	Malarial poisoning, chronic gastritis	6,600,900	.....	80	7,050,000	.....	80	
(V.)	50	56	F.	Hemiplegia; January 12, 1894 .	5,975,000	12,500	65	6,550,000	12,500	80	At an interval of one hour after massage.
	51	...	...	January 18, " .	4,950,000	.....	65	5,250,000	.....	70	At interval of ten minutes after massage.
	52	...	...	.....	.....	.....	.....	8,912,000	.....	70	One hour and ten minutes after massage.
	53	...	...	.....	5,002,500	12,500	65	8,240,500	75,000	70	One hour's massage; first examination fifteen minutes after massage.
	54	...	...	January 25, 1894, 3 P.M. . .	.....	.....	.....	7,297,500	25,000	78	One hour and fifteen minutes after massage.
	55	...	...	" 30, " 3 P.M. . .	5,750,000	.....	67	7,975,000	.....	70	Immediately after one hour's massage.
	56	...	...	5.15 P.M. . .	.....	.....	.....	8,845,000	.....	70	One-half hour after.
	57	...	...	.....	.....	.....	.....	6,875,000	.....	70	Three hours and fifteen minutes after massage, *i. e.*, 8 P.M.; supper at 6 o'clock.
XXVIII.	58	...	...	Neurasthenia following dysentery, January 20th.	5,612,500	.....	69	8,062,500	.....	70	Dinner one hour before treatment.
				.....	.....	.....	.....	5,512,500	.....	68	Half-hour after massage. One and one-half hours after massage.

Case.	Observation	Age.	Sex.	Disease.	Before massage.			After massage.			Remarks.
					R. B. C.	W.B.C.	H.	R. B. C.	W.B.C.	H.	
XXIX.	59	...	M.	Malarial fever for three months, tertian; January 1st.	2,988,000	4,500	42	.....	.....	.....	No organisms in blood at time of count; aortic insufficiency.
				January 2d . . .	3,004,000	5,000	42	3,104,000	7,500	45	
XXX.	60	19	M.	Malarial fever, paroxysm 22 hours Jan. 4th, temp. 105° F. Jan. 5th.	3,456,000	4,000	59	3,680,000	6,000	64	Had had previous attack Oct., 1893, of double tertian; counted one hour after massage.
				Quinine, gr. lx., Jan. 5th and 6th, temp. 101.5°. Jan. 6.	3,232,000	3,500	60	3,392,000	4,500	60	Many crescentic and ovoid organisms seen.

Administration of Iron.

Case.	Observation	Age.	Sex.	Disease.	Before administration of iron.			After administration of iron.			Remarks.
					R. B. C.	W.B.C.	H.	R. B. C.	W.B.C.	H.	
XXXI.	61	38	F.	Fat, anæmic, slight chronic gastritis	4,950,000	.....	85	6,800,000	.....	85	Fat; mucous membranes very pallid; gr. 5 iron pyrophosphate every two hours; took gr. 120 in four days, and ♏ 10 t. d. tr. ferri chloridi.
(XXII.)	62	50	F.	See Obs. 35-38	3,200,000	.....	60	4,160,000	.....	70	Patient gained greatly since last count; appearance much improved. Pyrophosphate gr. 95 in two days
XXXII.	63	20	F.	Epilepsy, minor	4,300,000	.....	50	4,600,000	.....	50	Pyrophosphate gr. 60 in thirty-six hours; appearance highly anæmic.
XXXIII.	64	28	F.	" major	4,300,000	.....	65	4,850,000	.....	70	Pyrophosphate gr. 90 in two and a half days; appearance extraordinarily anæmic.
XXXIV.	65	24	F.	Neurasthenia, dysmenorrhœa .	5,225,000	.....	85	7,000,000	.....	90	In 48 hours took pyrophosphate gr. 60 and pil. Blaud. gr.36; appearance highly anæmic.

Use of Faradism.

Case.	Observation	Age.	Sex.	Disease.	Before use of faradism.			After use of faradism.			Remarks.
					R. B. C.	W.B.C.	H.	R. B. C.	W.B.C.	H.	
XXXV.	66	59	M.	Hemiplegia—general senile degenerative changes.	6,215,000	12,500	.....	6,200,000	15,000	.....	Patient very weak. Slowly interrupted faradic current to all the muscles, occupying one hour.
	67	...	...	Same case	5,300,000	12,500	75	6,175,000	15,000	75	

Any efficient variety of the several types of manipulation which go under the common name of massage would produce similar if not equally marked results. In some of the cases where I did not personally oversee or direct the massage, half an hour was thought by the attendant a sufficiently prolonged application. The counts of these patients showed such small changes that inquiry was made, and afterward in the same cases a longer rubbing was used, with much more decided increase. If general massage is to be of service, it will be found that a full hour must be given to it.

A large proportion of the cases were examined by myself. The rest were divided among several observers, in order to eliminate as far as might be the element of personal error. I am especially indebted to the assistance of Dr. C. W. Burr and Dr. F. S. Pearce. The kindness of Dr. John H. Musser, Physician to the Presbyterian Hospital, allowed Dr. Pearce to examine a number of patients under Dr. Musser's care in that institution, including one in whom "pernicious anæmia" would seem a permissible diagnosis, and another (Case XXII.) which might, if judged by the blood, have been similarly classed, although there were also present severe spinal (ataxic) and hysterical symptoms, reversed and contracted color-fields, hemi-anæsthesia, etc. Several cases were counted at various times by all three of us, and Case XX. had the advantage of an examination by Dr. Frederick P. Henry, whose great experience in the study of the blood makes his confirmation of the results very valuable. I am indebted for the notes of the cases of malarial fever (Cases XXIX. and XXX.) to the politeness of Dr. John S. Billings, Jr., Resident Physician of the Johns Hopkins Hospital.

The instruments used were the Thoma-Zeiss hæmocytometer and Fleischl's hæmoglobinometer in all cases except two or three of my own, where the counts were made with the Malassez "compte-globule;" the estimates made side by side with the Malassez and Zeiss instruments were generally in remarkably close accord.

The preceding tables explain themselves for the most part. In the first columns the "cases" and "observations" are numbered separately for convenience of reference, the age and sex are given, and a brief diagnosis; then follow the state of the red and white corpuscles and the hæmoglobin value before massage, and in the same order in the last three columns are presented the results of examination following massage. The manipulation was, except where otherwise noted, a full hour of thorough, deep general massage.

Perhaps one of the most striking results of an examination of the above figures is the large number of cases in which the count before massage far exceeded the ordinary normal standard of the text-books in the number of corpuscles in a cubic millimetre. Apparently a good many of the cases had some degree of plethora. Seventeen persons

presented more than five and a half million of corpuscles, and of this number six had more than six and a half million. Yet, except two perfectly healthy individuals, there was scarcely one of these who would not have been at once described as "anæmic" if judged by the external appearance alone. It is, of course, to be said that some of them, like Cases VIII., IX., and X., were under full feeding and receiving every possible tonic treatment; still, one would not ordinarily suspect a patient with anterior poliomyelitis of long standing of having over six million corpuscles and over 110 per cent. of hæmoglobin, especially one many weeks in a hospital. Still less would it generally be thought that a hospital resident physician would have such an excess of corpuscles and hæmoglobin as obtained in Case I.; the effect of a year or two's living in a hospital usually is to blanch them effectually. But all of these cases were examined more than once, and in all of them the excessive number of corpuscles was verified by the results of more than one observer. Cases VIII. and X. were both examined by Dr. Burr and by me at different times, with counts practically the same.

The next most striking fact is that, while a very large increase of corpuscles was the rule, there was in only about half the cases a decided addition to the amount of hæmoglobin after massage. In this respect the results differed very decidedly from those of Winternitz, who found an average increase of about 15 per cent. in the hæmoglobin scale after his hydrotherapeutic applications. Twenty showed an increase of 5 per cent. or over. A less difference than this cannot be accurately read on Fleischl's instrument, and although changes of less amount are noted in the table, they are for that reason not included in this summary. The discussion of these facts may be postponed for the present.

First, in examining the reason for this increase in the corpuscles, must be considered whether it is only a matter of alteration in the superficial circulation. It is hardly possible to dogmatically say it is not, since it cannot be proved, although some facts point very strongly that way. The superficial vessels are dilated by the stimulation of their muscles and nerves through massage, but the deeper ones are affected too, the alternate squeezing and relaxation by the hand-grasp acting like the heart-contraction to empty them and to encourage their rapid refilling. Nor would the supposition that the surface blood-currents are hastened serve to account for the steady, continuous, and well-maintained improvement which is had in anæmia by the use of massage, nor to explain the large increase resulting from rubbing the abdomen alone, as in Case XXIV. (Obs. 45). Of course, it may be attributed in part to the indirect effect upon the quantity of blood in the peripheral channels from the accelerated movement of the large amount of that fluid in the abdominal vessels. Yet, even if in anæmia the circulation in the peripheral vessels is insufficient, as the coldness of the extremities and

the general surface pallor show, how does it come that the relative proportion of corpuscles in a given quantity of blood can be altered by massage? If it be said that it is a sufficient explanation of the improvement which results from massage, that the increase is due to the fact that before manipulation the quantity of blood in these vessels was less than it should be and that more was brought into them by the treatment, the increase of the number of corpuscles in a cubic millimetre would still be left unaccounted for. There would be more blood in the vessels—but would there be more cells in a given quantity of it? Somehow, globules must have been called into circulation which were not previously in active movement through the body. If cells thus out of service can be induced to go upon their way through the vessels it certainly follows that an anæmia like that of Case XXVIII., and many others, is not, in the ordinary sense of the word, an anæmia at all. In Case XXVIII. before massage there were 4,500,000 corpuscles and 70 per cent. of hæmoglobin; after massage, 6,400,000 corpuscles and 85 per cent. of hæmoglobin. Corpuscles could not have been manufactured in that time to meet the demand created by an increased superficial circulation; they must have been in reserve for emergencies, or lingering, as I said in my "Preliminary Note," in the byways of the circulation, and what appeared to be an anæmia was really but a lack of activity in the corpuscles or in the circulating fluid generally. Some such explanation as that all the globules were not in use will answer for such an instance, where both the corpuscular elements and the hæmoglobin were greatly increased by massage. But the same explanation will not do for the much larger number of examples where there was a decided increase in the number of corpuscles, without like addition to the percentage of hæmoglobin. An hour's massage can scarcely cause increased production, though after repeated treatment the making of blood-cells may be stimulated; but the effect upon metabolic processes of increased activity and movement of the cells must, for the time at least, be much the same as though their number were actually as much greater as it seems to be.

Where the corpuscles are increased and the hæmoglobin remains as before, it is difficult to account for the lack of change in the amount of this substance. It may be that at any time there are a number of corpuscles carrying but little hæmoglobin, and that these are brought into action by the mechanical stimulation and general increase of the circulation. But before this happened where were they? The condition cannot be wholly due to disease, since it is present in healthy men (see Obs. 1 and 2). Did it arise only from adding to the number of red globules in the peripheral vessels at the expense of the rest of the circulation, the increase of hæmoglobin would be directly proportional to the increase of globules, but this is rarely the case In Case I., 10 per cent.

represented the increased hæmoglobin value, but the corpuscular addition was almost 50 per cent. of the original amount, and nowhere have we seen the hæmoglobin rise more than 15 per cent. One conclusion must be that even in health there are vast numbers of corpuscles available for use if called for. The deductions from this fact as to diseased conditions will be spoken of later.

As was also said in the "Preliminary Note" in the *Medical News*, it is not difficult to imagine some such explanation as possible when one recalls the appearance of the bloodvessels in living tissues under the microscope. "In the lesser capillaries there appears every now and then to be a clogging, and for a time the corpuscles scarcely move. When this state is overcome in one place, a like condition is evident in another little vessel. Even in the larger channels many corpuscles seem not to share in the general movement, and to be temporarily out of the current. The white ones especially cling along the walls, and some of the red ones progress less rapidly than others, or linger for an instant, as if they were in an eddy or a side current. A portion of the blood, therefore—and, when the whole capillary system is taken into account, it must be a large portion—is not at all times in active circulation."

What we can see under the microscope is what takes place in the tiniest branches of the extreme peripheral circulation. We can scarcely suppose that in the larger channels the same phenomenon is going on upon a more extended scale, for there the stronger movement of the current would forbid it.

Hayem has said that the improvement which we desire to make in anæmia is an increase in the *active and circulating* amount of hæmoglobin. Apparently this is exactly what we do get a small degree of by this method.

Another thing very desirable to know is whether the corpuscles thus introduced into circulation are in all respects similar to the ones normally found moving in the vessels. It has seemed to me in most of the cases that there has been no decided difference between the microscopic appearance of the corpuscles before and after massage. In a few instances, and more notably in those cases which were suffering from very high grades of anæmia, like Cases XX. and XXI., it appeared to me that the number of blood plaques was greater after massage; but the former case was one in which every symptom pointed to pernicious anæmia, and, while this diagnosis is very far as yet from being borne out by the result, yet the microscopic changes in the blood were all such as we are accustomed to find in cases of advanced progressive anæmia. There were numerous corpuscles very much increased in size; there were nucleated red corpuscles; there was poikilocytosis, and in several slides, Dr. F. P. Henry, who saw this patient in consultation with me, found upon staining a few nucleated red corpuscles. The white cor-

puscles were enormously increased; before massage they were only 1:1200, but after massage this proportion was very greatly altered, becoming 1:134. This also was one of the cases in which a great difference in the hæmoglobin percentage was effected. The Fleischl instrument before massage gave us between 15 and 18 per cent., and after massage over 30 per cent. My friend Dr. Judson Daland, who upon another occasion examined this patient,[1] tells me that the readings of the Fleischl hæmoglobinometer below 20 are much too low, and he has suggested a very ingenious plan for overcoming this difficulty. This same case is perhaps the one which shows most valuably the amazing effects of massage alone. The count, as will be seen from the table (Obs. 28–32), was, upon the 11th and 12th of January, 1,500,000 red corpuscles and 15 to 18 per cent. of hæmoglobin, while upon the 24th of January, the patient having in the interval had no other treatment than massage and rest in bed, without any excessive feeding, the count was 3,800,000 before and 5400,000 after manipulation. It is noticeable that in this examination the hæmoglobin was the same both before and after treatment—between 30 and 35 per cent.—and was not materially increased over the percentage upon the previous occasion, when the count had been very much lower. All treatment having been stopped from the 24th of January, the patient receiving neither medicinal nor mechanical treatment of any kind, the corpuscles nevertheless went on increasing until, on January 31st, they had reached the amazing figure of 5,550,000, with 50 per cent. of hæmoglobin. This examination was made by Dr. Burr, and the next day, February 1st, I made an estimate myself, with the result of finding 5,900,000 corpuscles and 60 per cent. of hæmoglobin.

It will be seen from the column headed "Diseases" in the table, where a brief statement of the patient's condition is given, that almost every form of anæmia and malnutrition is included, and that in all but three of the observations there was an increase in the number of corpuscles, varying from a very slight addition to over three and a half million. Nor does the increase seem to depend at all on the form of disease from which the patient was suffering. In the several healthy cases the increase was great, although the persons examined appeared to be already in a condition approaching plethora, judged by the counts alone. This was an entirely unexpected result. In slighter anæmias the improvement was very marked (Cases XIV. and XV.). In malarial anæmia, of which two decided cases are in the table (Cases XII. and XXVI.), there were like changes. In forms due to malnutrition

[1] Dr. Daland made a single estimate with the hæmatokrit, giving as a result 2,500,000 red cells. The white cells could not be properly rated owing to the presence of large numbers of microcytes, which altered the white column unduly. At the same time I made observation No. 30, which, if accurate, would show a much larger number of red globules.

(Cases XVI., XXXI., XXXII., and XXXIII.); in severe simple anæmia (Case XXI.); in senile degenerative changes (Cases V. and VII.); in the case of extreme anæmia from atrophy of the gastric mucous membrane (Case XXIII.), and in the cases of metallic poisoning, which were of the most chronic description (Cases XXIV. and XXV.), varying degrees of increase resulted.

It was not always possible to make several successive examinations at short intervals of the same patient, as the time over which this would have spread the examinations would have introduced other factors, such as an unusually prolonged abstinence from food on the part of the patient; but, in some of the cases that were counted at intervals after rubbing, the increase was found in one hour or more to be greater than in a few minutes after the completion of manipulation (Obs. 53–58).

Hæmoglobin is occasionally increased by massage, but by no means uniformly; it appears to be rather the exception than the rule to find large addition to the percentage of coloring matter. It occurred in twenty cases (omitting increases of less than 5 per cent., which are untrustworthy); but in one or two of the more severe cases (Cases XVI., XVIII., XX., and XXII.) it was very marked. The source of supply of hæmoglobin for the red corpuscles is a matter still in doubt. Judging from the frequency with which a great reduction of hæmoglobin is seen in anæmias, while the corpuscular count remains near the normal (chlorotic type), the cells in all cases of poverty of blood vary less than the hæmoglobin; they may be inaccessible to our observation; they may themselves be affected by this reduction in their hæmoglobin value, so as to make them less active, and again it may be that the hæmoglobin-production cannot be so rapidly or readily increased as the manufacture of corpuscles.

With the exception of the one patient who died during the study of the blood, by far the worst case, judged by appearance, general symptoms, length of continuance of the disease, and by blood examination, was Case XX. By an accident she was given iron for a few days, which may somewhat have interfered with the result; but other than this she had no more treatment than rest in bed, without excessive feeding, and very thorough-going daily massage; yet, with this, as I have said before, the hæmoglobin and corpuscular elements both increased with amazing rapidity and continued to increase even when all treatment was stopped, a result which sufficiently does away with any idea that the improvement in these cases is due to a temporary effect upon the superficial circulation. Here again was to be seen a disproportionate improvement in hæmoglobin and corpuscles, for when the corpuscles had reached nearly six millions, the hæmoglobin had only attained to 60 per cent.

No doubt there is another factor in these causes of improvement: the

better tone of the muscles, of the heart, and of the general circulation, which is so quickly shown in such patients. Case XX. had mitral valvular disease and a consequent murmur, as well as a very loud and clear hæmic murmur, and suffered from a general deficiency of the circulation, manifesting itself in a tendency to chilliness and coldness of the extremities. The very first hour's massage left her warm and comfortable, and its effect was felt for several hours and continued from day to day to last during a longer period each time. The organic murmur was little changed, but the hæmic murmur, which, if altered at all during the first week, was somewhat louder, has constantly lessened in intensity till now it is a very faint, soft bruit.

A few words must be said about the results of the administration of iron in large doses during a very short time. The experiments (five) were too few to be conclusive, but in all there was marked increase of the corpuscles, although the hæmoglobin made no perceptible gain. The pyrophosphate was used because of its solubility and unirritating quality. The ease with which such large quantities of iron were borne by patients with the irritable digestion of anæmia was remarkable. Probably, had the drug been longer continued the hæmoglobin would have shown more effect of it. But this and other questions relative to the effects of medicine upon the cellular production must be reserved for further study. In one case (Case XXXV.), an unfavorable subject, a trial was made of the effect of slow faradic interruptions applied to the muscles, but the result is uncertain and the case is only added for its evidence of another means of tonic treatment.

To sum up, first, the *certain results*: In health, massage increases the number of red corpuscles, and to a less degree and not so constantly their hæmoglobin value.

In all forms and grades of anæmia there is a very constant large increase in the number of red corpuscles after massage; this is greatest at an interval of about an hour, after which it slowly decreases. This decrease is postponed more and more if the manipulation be daily repeated. An improvement also takes place in the general tone of the circulatory and muscular systems.

There is an occasional but inconstant increase in the hæmoglobin value, and this increase is proportionately less great than that of the cellular elements.

It has been doubted if so powerful and fatiguing a method of treatment as massage is safe or desirable in very high grade anæmias. It is now for the first time made clear that it is of great and certain service and without danger in such cases, no matter how feeble.

It is evident, too, that our present definitions of anæmia are insufficient. An essential part of the description in all of them is that there are defects of number, of color, or of both in the blood. This is not

necessarily or always true. The fault may lie in a lack of activity or of availability in the corpuscles. The state of things in the system may be, to draw an analogy from economic conditions, like the want of circulating money during times of panic, when gold is hoarded and not made use of, and interference with commerce and manufactures results.

Lastly, neither an anæmic appearance nor a blood count is alone enough for a certain diagnosis. Other signs must be used as a check on the blood examination for the establishment of the existence of anæmia. For instance, many cases here recorded had full normal or even supranormal corpuscle-count, with a good percentage of hæmoglobin. Yet they presented every external sign of poverty of blood: pallor of skin and, more important still, of mucous membranes, cold extremities, anorexia, indigestion, dyspnœa on trifling exertion. In such cases we must suppose either that the total volume of the blood is reduced, or that the usefulness of the corpuscles is in some way impaired, or that both these troubles exist together.

The white corpuscles have not received sufficient attention in this study, although it seems as if in most cases they were increased as well as the reds.

Next, as to *general conclusions*: It is possible that even in health there may be a certain varying percentage of corpuscles out of the moving current of the blood. If so, where are they, and what are they doing? We know by direct observation that all corpuscles do not travel with the same rapidity, that some loiter and delay. Our studies prove clearly enough that a great number of cells may be brought rapidly into the circulation by massage, and it seems at least probable, as Dr. Pearce has suggested to me, that those thus thrown into the current have less hæmoglobin value than the ones already in movement. This is a possible inference from the fact that corpuscular increase does not imply an addition of hæmoglobin, or at least not a proportionate addition. Have some of the globules thus cast into the hurrying stream of the blood been delaying to take up or unload their freights of coloring matter or oxygen? Do corpuscles in states of disease behave differently toward hæmoglobin, so that they absorb it less well, or transport it less successfully, or give it up with abnormal readiness? Some forms of anæmia may be due to an increased delay on the part of such cells as these, lingering sluggishly about their business, and only pushed and forced into greater activity and usefulness by the direct stimulus of massage. Whether these globules are immature ones or ones that have been made use of to the extent of their capacity also remains to be discovered.

Even when direct anæmia has been caused by hemorrhage, a part of the result may be due to the inactivity of a certain number of the corpuscles, and we may find in massage a valuable aid in the treatment of such cases, both by the impetus it will give to cells indisposed or dis-

abled for free movement, and by stimulation of the making of corpuscles. I hope soon to publish some facts as to the application of manipulation to such disorders.

The excess in amount of blood brought into the circulation by massage may be one of the reasons why in occasional sensitive patients we see such discomforts as headaches follow its use. Practically, we have added a certain number of millions of cells to their tissues, and need not be astonished if some signs of plethora result.

It is evident that massage has complex effects and that the numerical increase of the corpuscles, the added hæmoglobin value, and the better circulatory and muscular tone, may be due to many causes operating together—a vasomotor nerve stimulation, a direct hastening of the venous currents, an indirect hastening of arterial flow, an improved metabolism, are only some of them.

MYXŒDEMA, ACQUIRED AND CONGENITAL, AND THE USE OF THE THYROID EXTRACT.[1]

By George W. Crary, M.D.,
of New York.

But little new light has been thrown upon the morbid anatomy of this disease since the publication of two autopsies by Hun and Prudden, and of the report of the London Clinical Society,[3] in 1888, and I shall use largely their conclusions here in describing the post-mortem changes found in adults.

The Thyroid Gland: This is constantly the seat of disease. Usually much diminished in size, with excessive atrophy of its parenchyma and an increased amount of connective tissue. These changes are progressive and in some cases there is left little or no true gland substance. Hun and Prudden also found "new formation of lymphatic tissue in the thyroid."

The Skin: Separation of superficial layers of the corium. Atrophy of hair follicles (Hun and Prudden). Obliteration of lumen of sweat-glands and of sebaceous glands.

The Arteries: Obliterating endarteritis with atheromatous degeneration, and in places amyloid degeneration.

The Heart: Hypertrophy of left ventricle (Hun and Prudden). Interstitial myocarditis (Clin. Soc.).

[1] Read before the New York Academy of Medicine at its regular stated meeting of November 16, 1893.

[2] American Journal of the Medical Sciences, July and August, 1888.

[3] Report of London Clin. Soc., 1888, Committee on Myxœdema.

The Nervous System: Chronic diffuse neuritis only.[1]

The Kidneys: Chronic nephritis.

Interstitial changes occur also in the liver, the submaxillary gland, and in the adrenals.

The Blood: Diminished number of red corpuscles. White, normal. Diminished percentage of hæmoglobin.

The presence of mucin in increased quantities in the skin and other tissues does not seem to be constant in myxœdema, but would seem to be a marked feature in the strumipriva of lower animals.[2]

As to the pathology in the congenital variety, I have seen no report of autopsies performed. Hofmeister[3] removed in young rabbits the thyroid gland, but left the glandules of Gley, thereby leaving enough gland tissue to maintain life, and found that the hair became coarse, the body became short and thick, the growth of the skeleton was arrested, the epithelium of the convoluted tubules of the kidneys was altered, and enlargement of the hypophysis cerebri occurred.

Myxœdema is a disease of all ages, occurring at any time from the period of intra-uterine life to old age, but most commonly making its appearance, in infants, shortly after birth; in adults, in women near the time of the menopause. In the acquired form in adults, the clinical pictures presented when the disease has reached full development, show but few variations. In these cases the appearance is striking and characteristic. The facial expression is dull, heavy, and mask-like, and the natural lines are obliterated. The face is large and especially broad at the lower part; the skin is dry, sometimes smooth, cold, and waxy, sometimes wrinkled and scaly, but always thickened. The eyelids are swollen, sometimes to such an extent as to nearly close the eyes, and the constant effort to elevate the upper lids produces a characteristic arch of the eyebrows. The nose is swollen and the bridge is flattened. The lips are large and thick and protrude, the lower one being pendulous, and they are of a bluish or violet hue. The tongue is large and thick, and can be moved about but slowly and with difficulty. The fauces are swollen and the mucous membranes pale. There are quite constantly spots of hectic over the malar bones, which are in marked contrast to the color of the rest of the face, and there are often seen upon the sides of the face patches of cloasmata. Occasionally the whole face, and also the hands, will be of a yellowish tinge, and more rarely are stained a dark mahogany, simulating Addison's disease. The hair upon the head is thin and coarse, and the scalp dry and scaly. The whole body is swollen with an œdema, which does not pit upon pressure, although occasionally there

[1] AMERICAN JOURNAL OF THE MEDICAL SCIENCES, July and August, 1888. Greenfield: Edinburgh Med. Journ., May, 1893, p. 1048.

[2] Horsley: British Med. Journ., Jan. 17 and 31, 1885.

[3] Putnam: Trans. Assoc. Amer. Phys. 1893. viii. p. 343; AMER. JOURN. OF THE MED. SCIENCES, Oct. 1893.

will be associated with this condition, usually most marked in legs and feet, the ordinary œdema, which will pit. Hun and Prudden explain the non-pitting nature of the œdema in this disease by the fact that it is largely confined to the superficial layers of the corium, where the spaces are so small and the interlacement of the fibres so fine, that the fluid is not easily driven away by pressure. The skin is everywhere waxy, dry, and with more or less desquamation, sometimes in large flakes. A total absence of perspiration is the usual condition, although occasionally the body, and especially the neck and shoulders, will become temporarily covered with a clammy moisture. In my first case,[1] phenacetine and hot mustard foot-baths caused no sweating, and sinapisms no redness. There is little or no hair in the axillæ or upon the pubes. The nails and teeth are imperfect. The gums are spongy. The swelling is most marked in the clavicular regions, and often there exist here, and in the lower abdominal region, fatty tumors, which are not usually sharply circumscribed. The whole abdomen is large and pendulous. The swelling of the skin over the breasts often entirely hides the nipples. The swelling of the hands and fingers, and the dryness and inflexibility of the skin, cause great inconvenience to the patients. There is nearly always present dysphagia, and this is often so great that even liquid food can be swallowed only slowly and with difficulty, and solid food will be regurgitated. The swelling of the nasal mucous membrane makes it difficult or impossible to breathe through the nose, and there is loud snoring during sleep, and "blowing the nose" is accomplished in an unsatisfactory manner. The breathing is usually slow, and if for any reason is quickened, dyspnœa results. These attacks of dyspnœa are often a strongly marked feature. The speech is slow and monotonous, and is almost pathognomonic in its peculiarity.

The cutaneous sensibility to cold is great, and these patients are invariably worse during cold weather. There are usually subjective sensations, as of cold water being poured down the back or dropped upon the face or body. Deafness is usually present, and sometimes is marked. Smell and taste are sometimes impaired. There is paresis of all the muscles, and this is often so marked that the patient is scarcely able to stand without support, to lift anything with the hands, or to keep the head from sinking forward on to the chest. The movements of these patients are clumsy, and the walk is waddling. Bramwell[2] aptly describes them as "hippopotamus-like." Hemorrhages from mucous membranes are nearly always present, usually in attacks of varying severity, and at night they are prone to stain the pillow with a brownish fluid which comes from the mouth or nose. Rheumatoid pains are often complained of, especially in the wrists, ankles, and back, and there is often

[1] Med. Record, June 17, 1893.

[2] Edinburgh Med. Journ., xxxviii. p. 985.

pain and tenderness on pressure along the sterno-mastoid muscle on one or both sides. Headaches are generally complained of; anaphrodisia is common, and intercourse is usually painful in women. The temperature is low, ranging between 95° and 97.5°. Pulse usually about 70, and small; respirations between 17 and 18; heart-sounds feeble and muffled. Urine always of low specific gravity, between 1008 and 1014; usually acid, and containing a diminished amount of urea; albumin in small amount is generally found, and, as a rule, there are hyaline and granular casts. Irritability of the bladder, with frequent micturition, exists. The bowels are costive, the appetite is poor, and no special kind of food is craved. The mental condition presented by these cases is varied. There is present a condition resembling mild dementia, with lack of interest, listlessness, mental weakness, melancholia, and hallucinations. Dr. Starr,[1] who has fully described the mental state present in these cases, further states that "It is thus evident that both the afferent channels of communication from the external world and the efferent paths of impulse to the muscles were in some way blocked by the disease, while the internal processes of mental association and activity were also hampered and deflected from their ordinary course."

These features are usually all of gradual development, the disease running a very chronic course from the appearance of the first symptom, which may be the lassitude and indisposition to exertion, the paresis, or the swelling. The onset may, however, be sudden, but more commonly is very gradual. The course of the disease is chronic, lasting from the appearance of the first symptom until the death of the patient many years afterward. There are occasional periods of amelioration of many of the symptoms, and these patients are always benefited by warm weather. Bramwell states that the disease tends to inhibit childbearing, and that pregnancy induces more rapid development of the symptoms; but the case reported by Kirk,[2] in which the disease began at twenty, and the patient subsequently marrying, bore eight children, her condition being much improved during the periods of pregnancy, would show that this statement has exceptions.

When death occurs without complicating disease, a fall of temperature with coma usually precedes the end. The similarity of the mode of death to that due to uræmic poisoning suggests that the degeneration of the kidneys is the principal factor in causing a fatal termination.

In infants the disease presents special features by which it has been separated from myxœdema, and classed as a disease by itself, namely, cretinism. When occurring outside of those places where goitre and cretinism are endemic or even epidemic, and probably due to local causes, the term sporadic cretinism is used. This condition was sup-

[1] Trans. Amer. Phys., 1893. New York Med. Record, June 10, 1893.
[2] Lancet, September 23, 1893; Case iv.

posed to be intimately associated with myxœdema as early as 1873, when the first clinical study of the disease by Gull was published; and, since the report of the London Clinical Society in 1883, this connection has been fully appreciated. Osler[1] points out the necessity of limiting the term cretinism strictly to those cases due to loss of function of thyroid gland, whether this loss be due to congenital or progressive atrophy or even coarse changes. The special features referred to above are due to the arrest or retardation of growth and development, both mental and physical, which takes place in the congenital myxœdemic, from the time when the diseased condition of the thyroid has reached the degree necessary to affect the body nutrition. This may occur at varying periods of intra-uterine life, so that at the time of birth there may be the supra-clavicular fatty tumors, the thick redundant skin, the swelling of the hands and feet, the short extremities with the large, soft epiphyses and ossified apophyses, and the broad skull with wide-open sutures—making the diagnosis plain. These children usually die very soon after birth. In other cases the child is normal in appearance at birth, or there may exist a goitre, but at any time from then until it is five years old (Osler), the myxœdematous symptoms may begin to appear. I am inclined to believe that in most cases the evidences of sporadic cretinism begin to appear early, but that being at first of the nature of simple arrest of development, they do not for some time cause comment. The myxœdematous symptoms develop gradually, but at an early period in the life of the child the appearance has become characteristic. During the natural period of growth the changes become exaggerated, and an adult congenital myxœdemic, between twenty and thirty years of age, "is a being degenerate both physically and intellectually; short in stature and childish in appearance" (Osler). The height is usually about three and a half feet. There is marked lordosis, with large protruding abdomen, and the head is carried well forward between the shoulders. The epiphyses of the long bones are large, the arms and legs are short for the body, and there is genu varum, and with this is often associated a condition of genu valgum. The hands and feet are large and puffy, and the fingers broad and clumsy; the skin of the body is thickened and waxy, often dry and scaly, and seems too large for the body. The hair is often thick on the scalp, sometimes present on the face, but is thin or wanting in the axillæ and on the pubes. Supra-clavicular swellings, and often fatty growths, in these and other regions are present. The facial expression is usually dull and stupid, but these little people are easily pleased, and their expression at such times is a smiling one. The eyes are more or less closed by the swelling of the lids and are widely separated. The nose is retroussé, with broad flat

[1] Trans. Assoc. Amer. Phys., 1893. AMER. JOURN. MED. SCI., Nov. 1893.

bridge and wide prominent nostrils. The tongue is large and thick, and in most cases protudes constantly from the mouth. The lips are thick and prominent, the mouth is large and usually open. The skull is brachycephalic and broad. Asymmetry of the body and head is commonly present. The muscles are weak. The mental condition varies from complete idiocy to a condition of simply feeble intelligence. In the more marked cases deaf-mutism is also present. The memory seems as a rule to be good. Epileptiform convulsions are not rare. That there are many grades of cretinism as regards the mental condition is well recognized, but that there are also degrees as regards the physical development has not been strongly enough brought out. The use of the term congenital myxœdema for cretinism, gives us a wider range of classification; and the diagnosis is to be made not alone upon the dwarfed stature and the mental deficiency, but also and principally upon the condition of the skin and connective tissue (Horsley); or, in other words, upon those same evidences upon which we make the diagnosis of the acquired form of the same disease in adults.

These children learn to walk and talk, if at all, quite late in life, and their gait is a peculiar waddle. Dentition is delayed and slow, the teeth rapidly decaying. They have subnormal temperature and in winter suffer from the cold and are prone to "coughs and colds."

A comparison of the descriptions of acquired myxœdema and cretinism just given show many points of striking similarity, and this likeness would be more marked were it not for the difference in stature.

As to the etiology of myxœdema but little is known. In adults there is usually a history of some severe drain upon the health and strength of the individual, through severe hemorrhage, prolonged and severe vomiting as from sea-sickness, intense and protracted mental worry, frequently recurring pregnancies, etc. In attributing the origin of the disease in any case to a severe hemorrhage the tendency to hemorrhages in these cases, even at an early date, must be borne in mind. In both adults and children the family history is quite apt to show tubercular or neuropathic diatheses in contemporary relatives or ancestors.

The diagnosis of myxœdema in its fully developed condition is not difficult, especially when one has seen even a single case, for the different patients present a remarkable likeness to one another, and the disease has been frequently recognized by intelligent persons, not physicians, from the facial appearance alone. But there is one disease with which the acquired form of myxœdema may be, and many times has been confounded, namely, chronic Bright's disease. In my case previously reported and in the two first cases of acquired myxœdema given below, a diagnosis of chronic nephritis has been made to answer for all the symptoms for many years, and one case of chronic Bright's has been sent to me as a possible case of myxœdema. In the clinical pictures presented

there are many points of similarity, and this is especially true when in myxœdema there are active changes in the kidneys. In both myxœdema and Bright's there is the general swelling, the dyspnœa, the feeble heart, the headaches, the occasional hemorrhages from the mucous membranes, and the general weakness; and an examination of the urine shows the diminished quantity of low specific gravity, containing a small percentage of urea and albumin, with usually hyaline and granular, and sometimes even epithelial casts. The non-pitting nature of the œdema and a careful study of its distribution—for the œdema of Bright's, being affected by gravity as well as by pressure, is found most marked in the dependent portions of the face, body, and extremities, while in myxœdema it is of more general distribution—the dry, rough skin with no sweating, the falling of the hair, the dysphagia, and the subnormal temperature, are some of the most striking features present in myxœdema and do not exist in chronic nephritis. These points, with the manner of speaking and the tone of the voice, will make the differentiation not difficult. While, then, the disease when fully developed presents symptoms which are sufficiently characteristic to be rightly interpreted after an ordinarily careful examination, real difficulty may exist in the early stages of the disease, and a thorough study of all the symptoms presented by the patient be necessary before the diagnosis can be made. The congenital form of the disease in infants in some degree simulates rhachitis, but the mistake in diagnosis is not apt to occur.

TREATMENT.—The treatment of myxœdema by the thyroid gland has come to stay, and to Dr. G. R. Murray, of Newcastle, England, belongs the credit of its first practical application. Associated with his name in this matter must be those of Mackenzie, of London, and Fox, of Plymouth, England, who, with Howitz, first used the treatment by the stomach. A very clear idea of the gradual progress in experimental work which led to Murray's consummation can be obtained by reading the "Historical Summary," in Dr. Kinnicutt's[1] late article, where the names of Ord and Horsley are given justifiable prominence. In administering thyroid gland to persons suffering from myxœdema, we supply to them a "something" of which they are deprived by the functional inactivity of their diseased thyroid, thereby causing to disappear most of the abnormal conditions to which such deprivation gave rise. One of these abnormal conditions, however, does not always disappear, viz., the anæmia. It may or it may not be true that a direct hæmapoietic function belongs to the thyroid, but it is a fact that all the other symptoms of myxœdema may be caused to disappear by the use of thyroid extract, and the anæmia of the disease not only not be benefited,

[1] Trans. Assoc. Amer. Phys., 1893, p. 314. N. Y. Med. Rec., Oct. 7, 1893.

but actually aggravated;[1] though in some cases, and notably in Murray's monkey,[2] the red corpuscles and percentage of hæmoglobin are increased. Further experimentation and the use of thyroid extract in simple anæmia will throw more light on this point. The temperature is caused to rise, and the pulse and respiration are increased in frequency by the thyroid administration. That this is due directly to the thyroid gland as such, and not to ptomaïne or septic poisoning, was well shown by the bacteriological examination made by Dr. Lambert, and included in my former report, of the very lot of extract which caused such alarming effects in my first case, and by the fact that when this same extract was administered in smaller but gradually increasing doses, no further trouble was caused. The various bad effects of thyroid, noted in reported cases, seem to have been caused by too large dosage. When the hypodermatic method has been used, aside from the occasional abscesses which have been caused at the point of injection, and which are not due to anything thyroid in the preparation, flushing of the face, headaches, indefinite pains, nausea, vertigo, weakness and fainting, are frequently noted, and in two cases[3] epileptiform convulsions have been recorded. When given by the stomach, nausea, vomiting, pains, weakness, profuse perspiration, depression, headaches, rapid heart, and "toxic symptoms accompanied by extreme feebleness of heart,"[4] have been observed.

The action of thyroid extract upon the urine in myxœdema is worthy of special consideration. The amount of urine is increased, the specific gravity is higher, the urea is increased,[5] and the albumin and casts disappear. All these changes were well shown in my first case already reported. Ord[6] has pointed out that during the first two or three weeks the nitrogen excreted is in excess of that in the food taken, and that this excretion is mostly as urea. This excretion of nitrogen in excess is well shown by the careful investigations of Vermehren[7] upon four cases of myxœdema, and this observer also found that the thyroid administration had a similar effect upon the urine in senility, though to a less marked degree; and that in myxœdema a much less percentage of the nitrogen taken in the food was found in the feces, proving the more complete absorption. The observations of Ord, Alexander Napier, and others, bear out the statement which I have already made, that "at the time when the general swelling was being most actively reduced by the extract, the daily amount of urea was increased." This reduction in the body weight is most active during the first two or three weeks of

[1] Putnam: Trans. Assoc. Amer. Phys., 1893, p. 337. AMER. JOURN. MED. SCI., Oct. 1893. Thompson: Trans. Assoc. Amer. Phys., 1893; N. Y. Med. Rec., 1893, xliv. p. 174.
[2] Brit. Med. Journ., Sept. 1893, p. 23.
[3] Murray: Brit. Med. Journ., 1892, ii. p. 540. Hearn: Ibid., p. 452.
[4] Lundie: Edin. Med. Journ., May, 1893, xxxviii.
[5] Alex. Napier: Lancet, Sept. 30, 1893.
[6] Brit. Med. Journ., July 29, 1893.
[7] Deutsche medicin. Wochenschr, Oct. 26, 1893.

the treatment, and its rapidity will depend upon the amount of thyroid given. The curative effect of the administration upon the myxœdematous symptoms in the adult are known and constant, as the weekly reports of numerous cases show. Two men have, however, reported failures: Mitchell-Clark,[1] two cases; and W. C. Krause,[2] of Buffalo, two cases. By mistake, Kinnicutt used a lymphatic gland minced, without any reaction, and Lundie, for a month, used thymus before finding his error, and obtained no other result than elevation of temperature; and I should presume that such mistakes had occurred to others, among whom may possibly be Mitchell-Clark and Krause.

In all the cases under my observation, and in many of the reported cases, the rheumatoid pains in the joints have been aggravated by the treatment; and in two of my cases acute attacks of joint inflammation, with redness, swelling, and severe pain, have occurred, accompanied by a rise of temperature, and these attacks were controlled by anti-rheumatic remedies. With the exception of the anæmia and the rheumatoid pains, the symptoms of acquired myxœdema are regularly caused to disappear by the use of some preparation of the thyroid gland after from three to four months' treatment. Murray[3] puts the duration of this, his "first stage" of the treatment, at six weeks, and with the hypodermatic method it is possible that this period may be shorter than when treated by the stomach. During this time the patient must be carefully watched, and unusual exertion and mental excitement, and the administration of depressant drugs, such as pilocarpine,[4] should be avoided, and especially in cases with cardiac or arterial degeneration, and, indeed, in such cases absolute rest in bed is desirable.[5] The result of thyroid treatment in congenital cases is summed up by John Thomson[6] as follows:

1. Growth of skeleton accelerated in infants, and recommenced in older cases. 2. Rapid disappearance of abnormal swelling. 3. Temperature raised. 4. Emaciation and muscular debility during first two or three months. 5. Distinct advance in mental capacity.

After the treatment has resulted in a so-called cure of the disease, much smaller doses will be required to maintain the patient in a condition of health. Cessation of treatment for a few weeks is followed by a gradual reappearance of the symptoms.

The thyroid glands are administered in various ways: when by the hypodermatic method, Murray's original preparation is most frequently used. This consists of a mixture containing one drachm each of expressed juice, glycerin, and a one-half of 1 per cent. watery solution of carbolic acid. Of this from five to fifteen minims are injected two

[1] Brit. Med. Journ., August 27, 1892.
[2] Med. Rev., Sept. 16, 1893.
[3] Lancet, 1893, vol. I. p. 1130.
[4] G. Stewart: London Practitioner, July, 1893.
[5] Brit. Med. Journ., August 27, 1892. John Thomson: Edin. Med. Journ., May, 1893.
[6] Brit. Med. Journ., Sept. 23, 1893.

or three times a week. Flushing of the face or pain at the seat of injection, which is preferably the lumbar region, should be taken as an indication to stop the injection. By the stomach, the feeding of minced, raw, or partially cooked glands, the powder, and the glycerin extract of various strengths, have been used with success. I have used the glycerin extract in all cases, and make it of a strength of twenty-four grains of gland to one drachm of glycerin. The glands are carefully cleaned, minced, and after maceration with the glycerin the mixture is allowed to stand for three or four days, after which it is filtered under pressure as required for use. Full asepsis is observed throughout the different steps, and an anhydrous glycerin, previously sterilized, is used. Diseased glands are discarded. The product should be kept away from the heat and light. The ordinary beginning dose of this preparation, for an adult, is five drops three times a day, to be gradually increased to fifteen drops; in infants, one drop three times a day should be given, and sixteen drops a day, in three divided doses, seems to be the limit of increase. From my experience, I believe that the glands of the young animal are productive of more good than those taken from the older sheep, and I now make use only of the glands taken from lambs; using the butcher's guide of ununited epiphysis to determine the approximate age. The cases reported below are significant in showing this difference. The extract thus made will keep for months without deterioration or apparent change.

The histories in the first two cases reported below have been very generously given to me by Dr. Starr, to whom the patients had been sent.

Case I.—Mrs. B., aged fifty-five years. Since the birth of last child, fourteen years ago, she has been suffering from present disease, and at that time was subjected to much mental worry, caused by the death of two children. Three weeks after this last delivery she was badly frightened. The first symptom which attracted attention was the swelling of the abdomen, and later came metrorrhagia, which was severe enough to cause anæmia. Menopause occurred ten years ago. About seven years after last accouchement, on awakening in the morning, the whole body was swollen, and shortly after this the skin showed irritation and became dry and scaly. She has had twitching of right arm, and at one time para-anæsthesia of right side; no paralysis, no hallucinations. The disease had been gradually progressive until her appearance at Dr. Starr's office on May 13th, at which time I first saw her. At this time the patient presented all the characteristics of a typical myxœdemic, in the swelling, skin, speech, dysphagia, dyspnœa, anidrosis, falling of the hair, the subnormal temperature, dulness of hearing, and hemorrhages from mucous membrane of mouth, and in her mental condition. There were slight hectic spots over malar bones, but no cloasmata, and pain along sterno-mastoid muscles and in the ankles was complained of. The patient was not confined to bed, or house, but was weak. Arch of eyebrows was characteristic. Anæmia was present,

but not marked. This patient was immediately put upon the glycerin extract of thyroid gland of sheep (gr. xxiv–ʒj), average weight of one lobe 189 gr.; gtt. viii, t. i. d., to be gradually increased. Three days later a change in the voice and in the physical appearance was perfectly apparent, and the patient herself said that her clothes were looser, and that she felt better. No rise in the temperature, either immediate or remote, was induced, and, taken by mouth, was 96.5° on the third day.

June 7. Free perspiration occurred, and the skin was somewhat less rough. She had now reached a dose of gtt. xiii, t. i. d.

12*th*. The patient was taking gtt. xx, t. i. d. The improvement was slow, but progressive; general swelling much diminished, finger-rings slipping off easily, and there was no dysphagia. Dyspnœa only on exertion.

July 26. Patient had reached gtt. xxiv, t. i. d., and had had no rise of temperature much above 97°, but on this date temperature rose to 100.5° and she suffered severely from rheumatic pains, especially in knees. Salol and phenacetine somewhat diminished pain, which, however, lasted for about a week, and thereafter frequently recurred. Hair continued to fall. Improvement slowly progressive.

August 2. I put the patient upon an extract made from the glands of lambs, of average weight of 20 grains to the lobe, and gtt. x, t. i. d. were given.

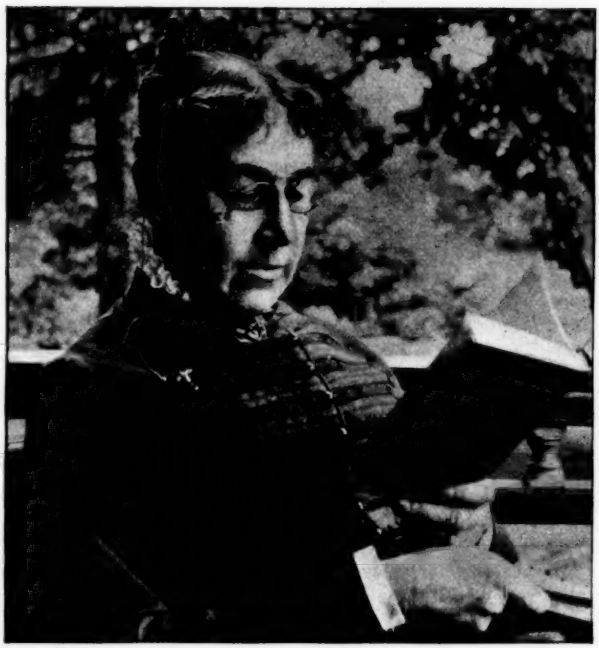
September 1. Since the change to the young glands the improvement has been rapid. Swelling diminished much more sensibly; hair ceased falling; exfoliation took place from whole body, and skin was soft and moist, and speech more nearly natural. Physical and mental strength greatly improved. During the following week the patient was without extract, and at the end of that time, though showing no signs of returning disease, was much prostrated. Extract was again begun and pushed rapidly to gtt. xv, t. i. d.

By the middle of September the patient showed a change that was marvellous, and was apparently in a perfectly normal condition, with the exception of the anæmia, with temperature of 98.8°. She was directed to diminish the amount of extract to gtt. xv twice a day, but at the end of two weeks complained that she felt that this was too little, and it was again increased to gtt. xv, t. i. d. This dose has been gradually diminished, and the patient remains well.

Case II.—Mrs. C. A photograph of this patient taken in 1881 shows a normal face with features clear and sharp, but with some slight fulness of the upper lids. The hair at this time was abundant and nearly white. The menopause occurred in 1883. Early in 1884, during an ocean voyage, this patient was badly frightened and dreadfully sea sick, perspiring most profusely. Later in this year the myxœdematous condition was well marked, the skin being dry and without perspiration, and this was the first symptom noted by the patient. Hands became very dark, almost mahogany color. She has had slight dysphagia since a girl, but after 1884 this became worse and was distressing. By the end of 1884 the slowness of speech and the swelling of the face, neck, body, and extremities were well advanced. The photograph herewith given was taken in 1887. (Fig. 1.) During the year 1890 she was attacked once with sudden loss of consciousness and fell. In January, 1892, she had pneumonia, which ran a regular course. Dr. Starr saw her first in May, 1891, at which time she was in a condition of chronic hysteria with the

condition of myxœdema well advanced, the eyes being nearly closed. The urine showed sp. gr. 1015, no albumin, no sugar; pale, cloudy, and with granular casts; the daily quantity was thirty-two ounces. On June 14, 1893, Dr. Wm. H. Thompson referred her to Dr. Starr for treatment by thyroid extract. At this time the diseased condition was far advanced and the general swelling marked. The mental symptoms were especially prominent; melancholia, apathy, hallucinations, and vivid dreams existed; marked dysphagia but no dyspnœa. Eyes nearly closed

FIG. 1.



and characteristic arch of eyebrows present. Temperature 97° and 98°; constipation. She was practically confined to her room. Thyroid extract from glands of old sheep with average weight of each lobe 189 grains, was given, beginning dose being gtt. vi, t. i. d.

July 6. Dose of extract was at this time gtt. x, t. i. d., and although the temperature had at times risen to 99.2° and was uniformly more nearly normal, the condition of the patient was practically unchanged. She was now given gtt. vii, t. i. d. of an extract which, though seven months old, was made from young glands averaging 19½ grains for each lobe.

19*th*. Since the change that was made in the extract ten days before, the constant elevation of temperature to above 99° has allowed of only small doses of the extract, varying from five to twenty drops daily, and notwithstanding these small doses the improvement has been marked;

the swelling of the face and body much reduced, the tongue and lips much less swollen and more mobile; she can pronounce "st." The dysphagia was less marked and the patient herself began to have hope. The skin was more natural, and sweating occurred on warm days. Pain was still present in the knees and very severe at the end of the spine. Her general strength was not much improved.

August 1. Extract, gtt. v, t. i. d. Temperature, morning, 97.5°; evening, 99.6°. The improvement had been gradually progressive and she felt in better health and spirits.

September 1. Extract, gtt. xvii, twice daily. Temperature, morning, 98°; evening, 98.5°. Very much improved and took short walks in the open air.

13*th*. The patient came into town and presented herself at Dr. Starr's office; and at his invitation I was present. Mrs. C. now looks, talks, and acts like a normal woman in good health. She is bright and cheerful. There was some stiffness and slight swelling still existing in the upper lip, her hands were small, and her whole skin soft and natural. She felt strong and well, and younger by many years, and looked so. She occasionally stains her pillow with the bloody mucus from the mouth. She occasionally had rheumatoid pains, and the anæmia was not improved.

CASE III.—Mrs. D., aged fifty-six years. The family history in this case is entirely negative. The patient had had only two children, both dying in infancy. Severe hemorrhage followed the birth of the last child, twenty years ago. Rapidly increasing paresis of all the muscles began ten years ago, and was the first symptom of the disease, and this became so pronounced that she walked with difficulty and could not hold up her head, which fell forward. The swelling soon came on, and with it darkening of skin of hands and face. For the last five years the skin has been dry and scaly and thickened, and all the other symptoms of the disease have gradually appeared, and to-day the picture presented is characteristic. There have been periods of improvement without known cause, and she is better in warm weather. She is very feeble and looks like an old woman, and in this case the analogy to senility pointed out by Vermehren is striking. Treatment was begun on October 19th. Extract of lambs' thyroids (gr. xxiv–℥j) being used in doses of five drops t. i. d.

November 1. Improvement already manifest and patient feels stronger. Mind less confused and memory better. Dysphagia nearly gone. Extract in doses gtt. x, t. i. d.

10*th*. Swallowing, speech, and hearing nearly normal. Desquamation ceased and discoloration fading from hands and face. Paresis disappearing and has discarded cane. Swelling much less. Hair ceased falling and upon scalp new hair coming. Anæmia not improved. Extract, gtt. x, t. i. d., continued.[1]

CASE IV.—D. D., female, aged five years. Born in Boston, of New England parents, who are persons of more than ordinary intelligence. No history of thyroid disease in the family of either parent. Mother partial invalid from neurasthenia for some years, both before and since marriage; she has irritable and rapid heart, is somewhat anæmic; her eyes are large, but exophthalmia is not present. During this pregnancy,

[1] November 22. Cerebral hemorrhage and complete hemiplegia.

her first and only one, she was ill for five weeks with tonsillitis, and during the second month she broke the third rib on the right side by an accidental blow from a hammer. No special worry was present, but vomiting persisted during the entire pregnancy. Delivery was instrumental and under ether anæsthesia, and the cord was around the neck. At birth the child weighed eight pounds and seemed normal in action and appearance. Nothing was noted until at three months, when the tongue seemed thick and the baby was pronounced tongue-tied. Her weight was then fifteen pounds and she seemed a normal child with the exception of the tongue and a state of chronic constipation. When four months old she cried at night a great deal and suffered from attacks of spasmodic dyspnœa. At six months it was noticed that the child had ceased to grow and was losing in weight, and this was attributed to the

FIG. 2.

nursing of the child by the mother, who was not at all strong. When eight months was reached it was appreciated that the child was far from normal, for the swelling of the face, the protrusion of the large and swollen tongue, and the lack of mental and physical development was painfully apparent to all. At eleven months the child was weaned, and the dysphagia was so marked as to necessitate feeding with a dropper. When two years old the two lower incisors appeared, but were small and soon discolored. At three years the general swelling was at its worst. During her fourth year epileptiform convulsions were frequent, some days as many as a dozen.

Last August the child came under the observation of Dr. G. F. Merrill, of Kennebunkport, Maine, and then for the first time the condition was recognized as being myxœdema, and I was asked to see the patient. The condition, both mental and physical, presented was that characteristic of the disease. Though five years old the child was of the size of a ten months' infant. The lordosis and the large prominent

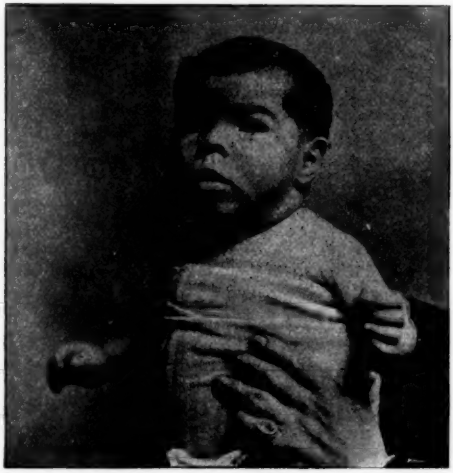
abdomen were especially marked; and the tibiæ were quite bowed in the lower third. The swelling of the face, nearly closing the eyes (Fig. 2), the marked mental apathy, and the protrusion of the tongue, gave the face the appearance of absolute intellectual vacuity. But on closer examination it was found that some degree of intelligence did exist, though the power of mental perception was very slow. Her attention was attracted with difficulty, and even a lighted match moved in front of her face was not followed by the eyes. Only loud noises would cause her to turn, and these she seemed unable to locate. No expression of face or body showed any response when she was called by name. Her disposition was good. When placed upon her back, upon the floor, she would, after many ineffectual attempts and much labor, succeed in turning over on to her face and belly, where she would lie exhausted by the effort. When sat upon the floor, she seemed incapable of maintaining the balance of the body, and would topple over without any effort to save herself or any fear as to the possible consequences. The condition of the skin was marked, and the hair on the head was thin and coarse and was also present upon the forehead and sides of the face. The axillary temperature ranged between 97° and 98°. A considerable degree of anæmia existed. Upon September 1st, the treatment with extract of lambs' thyroids, gr. xxiv to the drachm, was started with a beginning dose of one drop t. i. d. This was gradually increased until four drops were given, and the temperature caused to rise to 99°. Within a week, a letter received from Dr. Merrill stated that a change for the better was manifest, and on September 16th the father informed me that the appearance of the child was much improved and that she "noticed more." Upon September 27th, the child was brought to New York to remain under my personal observation. At this time, five drops t. i. d. were taken, and the temperature was normal. The swelling of the face and body was much reduced, the lips less prominent, and the tongue smaller and much more movable, and could be kept within the lips but not within the closed jaws. The skin was much softer and not so dry. The bowels were normal. She was certainly brighter, and looked up into the face of anyone approaching, and when her name was spoken would turn her head in the direction of the voice.

On the 5th and 6th of October, the temperature, which had been gradually rising upon fifteen and sixteen drops daily in three divided doses, reached 101° at midnight; and on the 7th, the dose was reduced to three drops three times a day. The improvement in the child's condition, bodily and mentally, during the previous ten days had been remarkable. Her appetite was much increased and her bowels were normal. The swelling of the face, body, and extremities was much reduced, and the natural lines of the face were beginning to show. The urine was much increased in amount. She did not sleep so much nor so well since the beginning of the treatment, and she cried more.

16*th*. This patient had continued to improve steadily, and at this time the manifestations of the disease which still remained were those which it takes time to grow away from. (Fig. 3.) Her mental aspect had improved even more than her physical condition, and on account of the increased mobility of the features, and the greater bodily activity displayed, her intellectual processes were more apparent. She looked with interest on surrounding objects, and when held before a third-story window followed with her eyes the passing persons, horses, and even

dogs. She made her wants better known, kicked her legs about, and when lying upon the bed her arms and legs would be in constant motion. When put upon the floor, with a little coaxing she would roll over and over as many as ten times. She used her hands as prehensile members, and she showed a disposition to learn to walk, but I discouraged

FIG. 3.



this until her body should weigh less and her legs be stronger, because of the tendency to bow-legs. Five teeth have appeared, and they seem sound and good. Only twice has she had convulsions since the beginning of the treatment. The following comparative measurements are of interest as showing the general diminution in the bulk of the body and the increased growth, between the two dates given—a period of about seven weeks.

	September 27.	November 14.
	Inches.	Inches.
Circumferences—		
Skull: Occipito-mental	21½	21
Horizontal	19½	18⅞
Face	19	18
Neck	12½	11
Right arm	5⅜	5
Left "	5½	5
Right forearm	5½	5½
Left "	6	5½
Left thigh	9½	9
Left leg	7	6¾
Upper chest	19¾	20
Lower "	21½	20
Abdomen	19	19½
Lengths—		
Right arm	4	4¼
Left "	3⅝	4¼
Right forearm	4	4½
Left "	4	4⅜
Lower extremity, left	10½	11

We must bear in mind that in treating congenital myxœdema we have not a pre-existing condition back to which we can bring our patients; but in these cases the first step in the treatment is to restore the health, and the second step is to maintain the child in a normal condition, so that the development of its mind and body will progress as in any other healthy child of the same apparent age. That such development will take place I feel sure, but until the cases have been kept under observation and treatment for some years, absolute proof cannot be had. It is my belief that if we break away from the term cretinism, with its vivid picture of the "pariah of Nature," and look more closely for the symptoms of myxœdema, we will find that many so-called idiots, imbeciles, cases of arrested development, etc., among children, are in fact cases of functional inactivity of the thyroid gland, and hence susceptible of treatment by thyroid extract, with improvement, and perhaps even cure.

The effects of thyroid administration may be summed up as follows:

Increased metabolism; shown by—

1. Elevation of temperature.
2. Increased appetite, with more complete absorption of nitrogenous foods.
3. Loss of weight, with nitrogen excreted in excess of that taken in the food.
4. Growth of skeleton in the very young.
5. Marked improvement in body nutrition generally.
6. Increased activity of mucous membranes, skin, and kidneys.

The rheumatic symptoms and the anæmia are not only not relieved, but are most frequently aggravated.

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MUSCULAR CRAMP, IN RELATION WITH THE PHENOMENA OF ANGINA PECTORIS AND "INTERMITTENT CLAUDICATION OF THE EXTREMITIES."

By F. Parkes Weber, M.A., M.D., M.R.C.P. (Lond.)

Edward Jenner,[1] founding his views on observations of his own and others, first suggested the "coronary" theory of angina pectoris—that is, the theory which supposes angina pectoris to be due to disease of the coronary arteries—which was afterward supported and developed by

[1] See his letter in "An Inquiry into the Symptoms and Causes of Syncope Anginosa," by Caleb Hillier Parry, M.D., Bath, 1799, p. 3.

Parry,[1] Kreysig,[2] Reeder,[3] etc. H. Huchard, of Paris, has recently in an admirably clear manner formulated his views on the subject (*Maladies du Cœur*, 2d ed., Paris, 1893). Huchard fully supports the coronary theory as far as true angina pectoris[4] is concerned; he thinks that it is a cramp of the heart-muscle, at first suggested in 1768 by Heberden,[5] and considers it to be a condition of the heart analogous to that in the limbs, which has been described by Charcot as "claudication intermittente des extremités." Huchard thus unites the "coronary," "cramp or spasm," and "claudication intermittente" theories of angina pectoris.

According to this author, the case stands as follows: H. Bouley, Jr.[6] (1831), described an affection of the extremities in horses, to which he gave the name of "claudication intermittente." In this rare affection the horse's hinder extremities are usually affected. The animal goes naturally for some distance, but after some time commences to limp, and then, if whipped on, appears to suffer greatly, and at length something like the following takes place: The animal falls down, is evidently in great pain, and there appear to be anæsthesia and a condition of rigidity in the affected extremities. These phenomena gradually pass off in half an hour or so; the animal regains its natural appearance, but, if whipped on again, the attack will recommence, and so on. At necropsies upon such horses, obliteration of the main artery of the affected limb (the abdominal aorta in cases where both hinder extremities were affected) has been found, and this obliteration of the arterial channel may be from thrombosis, pressure by a tumor from without, etc., but the precise nature of the cause does not affect the present subject under discussion.

Charcot (1858) described similar symptoms in a man.[7] In all cases the cause is arterial ischæmia of the affected extremity, due to the obliteration of the main artery supplying it, and the collateral circulation, though sufficient when the limb is at rest, is quite insufficient during exertion when an increased blood-supply is demanded. The condition, then, is a premonitory sign indicating the danger of gangrene, and

[1] Parry: Op. cit.

[2] See F. L. Kreysig: "Die Krankheiten des Herzens." Berlin, 1816, Pt. ii. pp. 543–546.

[3] H. Reeder: "A Practical Treatise on the Diseases of the Heart." London, 1821.

[4] He separates from true angina pectoris the nervous affections which he designates as "pseudo-anginas," a term previously employed by Dr. W. H. Walshe in "Diseases of the Lungs and Heart," 1st ed., 1851, p. 435.

A. Lartique already in 1846 distinguished what he called "pseudo-angina," or "pneumo-gastralgia" from true angina pectoris. See "De l'Angine de Poitrine." Paris, 1846, p. 112.

[5] See William Heberden, the elder: "Some Account of a Disorder of the Breast," in Med. Transactions of the Coll. of Phys. in London, 1772, vol. ii. p. 64. Heberden's account of angina pectoris was read in 1768, the same year in which it was independently, though less thoroughly, described in France by Rougnon.

[6] Arch. Gén. de Médecine, vol. xxvii., Paris, 1831, p. 425.

[7] Soc. de Biologie, Comptes-rendus, 1858, vol. v. p. 225 et seq. The part affected was the right lower limb of a man, aged fifty-four, who suffered from aneurism of the right common iliac artery. See also later papers by Charcot and others.

Charcot narrates that one of his patients suffering from this affection subsequently underwent amputation of his leg for gangrene.

According to Huchard,[1] Dr. Potain was the first (1870) to point out the analogy between "claudication intermittente des extremités" and angina pectoris, and to strengthen this analogy it may be stated that one of Charcot's patients, suffering from intermittent claudication of an extremity, subsequently died in an attack of angina pectoris.

If this analogy be strictly accepted, the coronary ischæmia[2] resulting from stenosis of the coronary arteries causes the cardiac muscle to fall into a state of spasm, just as the limb in Charcot's cases of "claudication intermittente des extremités." But if angina pectoris is really due to spasm of the cardiac muscle, how is it that the pulse may appear, at least in some cases, unaffected or comparatively little affected during the attack?

Such is the difficulty when the *heart* is concerned, but even in *intermittent claudication*[3] *of the extremities*, in spite of Charcot's cases, perhaps it may be asked if cramp forms a necessary feature. Charcot thought it was allied in nature to rigor mortis, but an earlier observer who apparently alluded to cases of the same nature (though he did not use the same term as Charcot), made no mention of either rigor-mortis-like rigidity or ordinary cramps in his description. I refer to Sir Benjamin Brodie, to whose writings on this subject my attention was directed by Mr. Maidlow.

Charcot, who described his first case in 1858, considered intermittent claudication of the extremities as a warning sign of impending gangrene; and Sir Benjamin Brodie, in 1846 (*Lectures on Pathology and Surgery*, London, 1846, p. 360), when describing the premonitory signs of senile gangrene, though he did not use the term "intermittent claudication," evidently alluded to the same class of phenomena as Charcot. Brodie must therefore, I think, be considered as having not only described the condition in man before the celebrated French doctor, but, as may be seen from the following quotation, he at the same time clearly drew up the analogy between it and angina pectoris.

[1] H. Huchard: "Maladies du Cœur." 2d ed., Paris, 1893, p. 608.

[2] On the subject of coronary ischæmia some of Cohnheim's experiments are remarkably interesting. See Cohnheim's "Lectures on General Pathology," New Sydenham Society's Transactions, 1889, vol. i. p. 35. After recalling the experiments of Von Bezold, Samuelson, and his own, he states that the ischæmia in such experiments probably produces its baneful effect through the action of the cardiac ganglia. He goes on to point out the difficulties in the way of accepting the "coronary" theory of angina pectoris. It must be remembered, however, in such experiments that the lesions are acute and affect a previously healthy cardiac muscle. The experiments do not, therefore, necessarily afford an analogy with what takes place when the coronary arteries become gradually stenosed by disease.

[3] This term admits of being used in English, and is, perhaps, as satisfactory as "meiopragie," the other term used by Huchard, and which he states that he has borrowed from Dr. Potain (Huchard, op. cit., p. 209).

Brodie's exact words are:

"If you cross-examine a patient who has mortification of the toes, he will generally tell you, that for three or four years preceding, he has had occasional pains in the lower limbs; a sense of numbness in them; that his feet were liable to be cold; that when they again became warm, after having been cold, they have been very painful; and that he has had a sense of weakness of the muscles. Such patients walk a short distance very well, *but when they attempt more than this the muscles seem to be unequal to the task, and they can walk no further. The muscles are not absolutely paralyzed, but in a state approaching to it.* The cause of all this is sufficiently obvious. The lower limbs require sometimes a larger and sometimes a smaller supply of blood. During exercise a larger supply is wanted on account of the increased action of the muscles; but the arteries being ossified or obliterated, and thus incapable of dilatation, the increased supply cannot be obtained. This state of things is not peculiar to the lower limbs. Wherever muscular structures exist the same cause will produce the same effect. Dr. Jenner first, and Dr. Parry, of Bath, afterward, published observations which were supposed to prove that the disease which is usually called "angina pectoris" depends on ossification of the coronary arteries. . . . When the coronary arteries are in this condition they may be capable of admitting a moderate supply of blood to the muscular structure of the heart; and as long as the patient makes no unusual exertion, the circulation goes on well enough; when, however, the heart is excited to increased action, whether it be during a fit of passion, or in running, or walking up stairs, or lifting weights, then, the ossified arteries being incapable of expanding so as to let in the additional quantity of blood which, under these circumstances, is required, its action stops and syncope ensues; and I say that this exactly corresponds to the sense of weakness and want of muscular power which exists in persons who have the arteries of the legs obstructed or ossified."

From this quotation it may be seen that Brodie, whilst clearly describing an intermittent claudication of the extremities, certainly did not consider cramp or other rigidity of the muscles to be a necessary accompaniment. Conversely, the following case shows that cramps in an extremity, though induced by arterial obliteration, may be unaccompanied by the other features of intermittent claudication of the extremities. The case is that of a man who, in 1889, had his left common (?) iliac artery obliterated from an accident. He is now able to get about fairly well, and has not noticed anything analogous to intermittent claudication of the limb as described by Charcot, though, when sleeping with both legs drawn up, he is awakened by cramp in the left leg (only). Here are some short notes of the case, which I am enabled to give through the kindness of Sir William Savory, whose house surgeon I was when the man was admitted at St. Bartholomew's in 1889.

Michael M., aged forty-one years. Admitted December 20, 1889; discharged May 30, 1890, for the Convalescent Home. The diagnosis in the case-book is "Injury to spine and abdomen—occlusion of left common iliac artery; partial paralysis of left lower extremity."

Following is a short abstract of the most important features:

The patient was crushed between buffers of engine and stage; very much collapsed; numbness of left leg; pain and tenderness in lower part of back and abdomen; loss of power over left leg; complete loss

of sensation below middle of thigh except over an area somewhat corresponding to that of the small sciatic. Pulsation in left posterior tibial artery could just be felt. Marked tenderness over lower part of abdomen. A distinct tumor (perhaps of extravasated blood?) could soon be felt in left inguinal region of abdomen.

Dec. 26, 1889. Bowels opened (without medicine) for the first time since admission.

27*th.* Can move thigh fairly, not leg or foot.

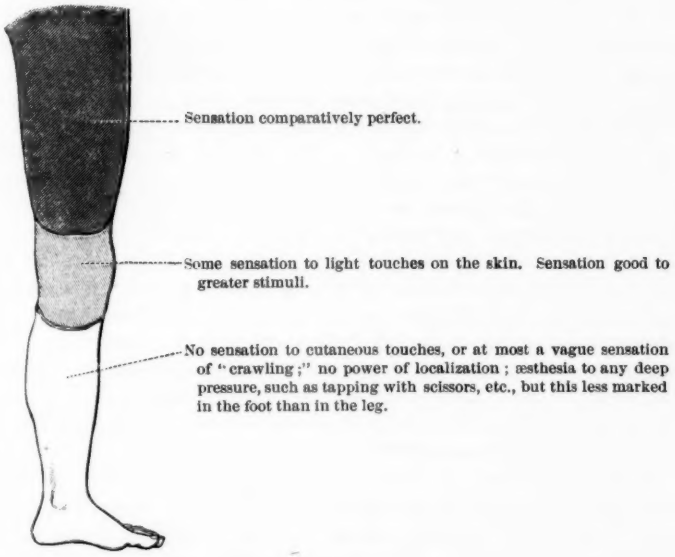
31*st.* Certainly no pulsation in femoral. Discoloration of heel.

Jan. 1, 1890. Very slight pulsation made out in femoral.

8*th.* Gangrenous patch formed on outside of leg.

10*th.* Sensation returning in leg slightly; gangrene of heel.

The sloughs separated and the sores became healthy. Anæsthesia appeared to be gradually and partially clearing up and power of motion to be returning. On May 30, 1890, could raise the leg from the bed. Following is a diagram of the anæsthesia in the limb on May 16, 1890:


Sensation comparatively perfect.
Some sensation to light touches on the skin. Sensation good to greater stimuli.
No sensation to cutaneous touches, or at most a vague sensation of "crawling;" no power of localization; æsthesia to any deep pressure, such as tapping with scissors, etc., but this less marked in the foot than in the leg.

Patient seen again in November, 1893.

Had had in the meantime gangrene of portions of the toes of left foot and had undergone tenotomy of the left tendo Achillis (with wrenching of the ankle-joint) on account of the left foot having become fixed in position of equinus.

Very faint pulsation can be felt in the left femoral artery. There is still considerable impairment of sensation in left lower extremity. Over the greater portion of the front of the leg below the knee, and over part of the sole of the foot, superficial sensation is entirely absent (as tested by gentle touching with a pin, etc.), but there is hyperæsthesia for deep

sensation, especially when pressure is applied over the shin. Perhaps some of this tenderness is periosteal. The left leg feels colder to the touch than the right one. The left lower extremity is decidedly somewhat wasted, especially at the calf. He does not complain of any symptoms on walking analogous to "claudication intermittente des extremités" as described by Charcot in man. He walks about fairly well considering that in spite of the operation there is still partial ankylosis in the left ankle-joint. A curious fact is that when lying in bed and asleep he is sometimes awakened by cramp in the left leg. This is only when he goes to sleep with his legs drawn up, and although both legs be drawn up, the cramp is only in the *left* leg.

An explanation of ordinary[1] muscular cramps (such as those sometimes affecting the legs of healthy persons after violent exertion and at night time) is that they are due to the irritation caused by the accumulation of waste products in the affected muscles. By the waste products the endings of the centripetal nerves in the muscles are irritated and the cramp or tetanic contraction is a reflex result. This theory explains the frequency of cramps on going to sleep, for the commencement of sleep favors reflex movements and cramps are perhaps merely an exaggeration of the jerking movements in limbs which in some people not infrequently wake them up just as they are dosing off. This theory of cramps accounts, moreover, for the tendency to their occurrence in healthy people after violent physical exertion, such as rowing in a race, etc. The violent exercise causes an excessive catabolic process in the muscles and consequently such an accumulation of waste products in these parts that even a healthy circulation takes considerable time to remove them. In the meantime there is a tendency to cramps in the muscles which have been most used, and a rowing man who assures me of the frequency of cramps after violent rowing says that, when they occur, they do not necessarily follow immediately after the exercise, but may come on at any moment for some time afterward. The same theory of cramps accounts also for the peculiarity of their occurrence in the patient Michael M., whose case I have just given. In his case they occur only when sleeping "with his legs drawn up" and are limited to the left lower extremity. This is the extremity in which the blood-supply is defective, owing to the obliteration of the common(?) iliac artery on that side, which took place some years ago. In his case probably the blood-supply furnished by the collateral circulation is insufficient and has difficulty in washing away the waste products, and this difficulty is increased when the position of the patient in bed ("with his legs drawn up") renders the circulation in the extremity still more

[1] Of course cramps may arise from different causes. They need not be reflex, but may arise from direct stimulation (experimental or due to disease) of any part in the nervous motor tract. The cramps of cholera, however, and of choleraic diarrhœa may be due in part to the accumulation of waste products, which the sluggish blood-stream and diminished quantity of blood are insufficient to clear the muscles of.—Cf. Dr. P. Z. Murphy, *Lancet*, 1853, vol. i. p. 511.

defective. Hence the cramps in that extremity at night-time, the time which favors reflex movements.

If the "waste-products" theory of muscular cramps be correct, then it is not surprising if, quite apart from Charcot's rigor-mortis-like rigidity, ordinary cramps should occur frequently in such patients as those whose cases Charcot has described under "claudication intermittente des extremités," since this is a condition primarily due to arterial ischæmia, and in which the waste products are imperfectly washed away. These cramps, however, need not necessarily be associated with intermittent claudication of the extremities, and the previous quotation shows that Brodie did not attach great importance to them. It is, I think, the powerlessness described by him, rather than cramps or rigor-mortis-like rigidity, which is to be considered as the essential part of "intermittent claudication of the extremities."

I will endeavor to make my meaning clearer by the following consideration: "Claudication intermittente" is obviously a question of degree; a muscle imperfectly supplied with blood cannot do as much work as one properly supplied, but a limit to the possible work exists in both cases, easily reached in the former, but only on the most violent exercise in the latter. Thus an athlete in a race may, so to speak, "use himself up" completely, so that at the end of the race he is incapable of any further exertion. This is really nothing but a "claudication" in a healthy man, exactly analogous to "claudication intermittente" in the extremities of patients with diseased arteries. It is noteworthy that when a man has undergone continued violent muscular exercise cramps may follow, but in this case no cramp necessarily takes place at the moment of giving up; on the contrary, as I have already mentioned, a tendency to cramps may exist for some time after. These considerations, I think, illustrate the subject under discussion and really help toward explaining the relation of the cramps to the sudden feebleness in "claudication intermittente" of the extremities, namely, that both are favored by the same condition, which is stenosis of the main artery of the affected part.

From the extremities I shall now return to the heart, and think the same considerations have some bearing on the subject of angina pectoris. If, as seems probable, angina pectoris is really a "claudication intermittente" of the cardiac muscle, due to coronary ischæmia, then, as in the extremities, cramps will not be a necessary feature; and, indeed, the pulse almost precludes the idea that ordinary angina pectoris is a cramp of the heart-muscle. It will then be asked: When the main arteries are stenosed, why should not cramps be likely to occur in the heart as in the extremities? It probably does occur[1] at times, and is expressed

[1] A cessation of the heart's action in systole (or spasm) is probably the most frequent form of cardiac syncope.

by syncope, which[1] may be the fatal termination in angina pectoris.[2] According to this view one may discard the "cramp" or "spasm" theory of angina pectoris, whilst still retaining the "intermittent claudication" theory, regarding the latter term as synonymous with the "coronary" theory, and as affording the explanation of the phenomena of true angina pectoris; when it is accompanied by syncope, then, and then only, can cramp of the heart be considered as playing any part in the *ensemble* of an attack of angina pectoris.

I will only add a few words, and these are regarding the "coronary" theory of true angina pectoris, which I have almost taken for granted in the foregoing words, but which seems to be as yet not universally accepted. A chief objection to the "coronary" theory is that stenosis of a coronary artery may be found post-mortem in individuals who have never been known to suffer from angina pectoris. This has been accounted for by anastomoses in the coronary circulation (see those pointed out by Dr. Samuel West, *Lancet*, 1883, vol. i. p. 945, and others). The alleged cases of true angina pectoris without organic disease[3] of the coronary arteries form a second objection to the "coronary" theory; but in these cases spasm of the coronaries may explain the attacks, as was maintained in the fatal case attributed by Huchard to the poison of tobacco (see Huchard, *op. cit.*, pp. 626 and 712). These are the chief objections to the "coronary artery theory," and they are

[1] This is the real justification for the name "syncope anginosa," suggested by Parry. Parry wrote: "I think it evidently appears that the angina pectoris is a mere case of syncope, or fainting, differing from the common syncope only in being preceded by an unusual degree of anxiety or pain in the region of the heart," etc. See Parry, op. cit., p. 67.

[2] If angina pectoris were a cramp of the heart the pain or anguish felt during the attack might be explained by supposing the nerve-endings to be stimulated by the contraction of the heart-muscle; which explanation would make the sensory phenomena of angina pectoris analogous to the pain felt during cramp in the calf of the leg. If, however, as I maintain, angina pectoris be not necessarily associated with cramp of the heart, another explanation must be adopted, such as that the pain is directly dependent on anæmia of the myocardium (Cf. Huchard, op. cit , pp. 618 and 619). This would make it analogous to the pains long ago recognized (see Percivall Pott, Chirurgical Works, 1775, p. 794) as premonitory signs in senile gangrene; the accumulation of waste products may likewise have something to do with its production, as in the production of the more chronic pains or "stiffness" in the limbs after violent exertion.

[3] On this question some of the earlier recorded necropsies are particularly interesting. In the first necropsy on a case of angina pectoris, recorded by Heberden, nothing to account for death was found. A gentleman had apparently heard of Heberden's description of angina pectoris, and considered that the symptoms corresponded with his own. Accordingly, on April 16, 1772 (see Med. Trans. Coll. Phys., London, 1785, vol. iii. p. 1), Dr. Heberden received a letter, signed "Unknown," from the gentleman describing his symptoms, and saying that he had left directions that, after his death, Dr. Heberden should have an opportunity of dissecting his body to find out the cause of the disease. The gentleman died suddenly within three weeks afterward, and Heberden obtained the services of Mr. John Hunter to make the examination, but no pathological change likely to cause death was discovered. Jenner (see Jenner's letter to Parry, in Parry, op. cit., p. 3), however, thought that in this case the coronary arteries were not examined. In a later case, examined by Hunter (narrated by Dr. J. Fothergill, in Medical Observations and Inquiries, 1776, vol. v. p. 225), ossification of the coronary arteries was found, and on Hunter's own death, in 1793, from angina pectoris, Sir Everard Home, forewarned by Jenner, discovered that the coronary arteries were diseased.

not unanswerable; whilst, on the other side, the well-known action of nitrite of amyl and trinitrin affords support to this theory. The beneficial action of nitrite of amyl in some cases of angina pectoris was first discovered by Dr. Lauder Brunton,[1] and has since been abundantly confirmed. He considered that it acted by lowering the peripheral resistance to the arterial stream and thereby diminishing the amount of the heart's work. It is obvious, then, how this therapeutic explanation of Dr. Brunton may be adduced in support to some extent of the theory that in patients with angina pectoris the coronary arteries are stenosed, and that, owing to this, the blood-supply to the cardiac muscle is limited, allowing it to do only a limited amount of work.

More detailed evidence from post-mortem statistics as to the presence of coronary disease in fatal cases of angina pectoris is given, amongst recent authors, by Huchard,[2] and it would be out of place to repeat it here; this paper deals with the part played by cramp in angina pectoris, and the "coronary" theory has been practically assumed.

It now rests with me to recapitulate the chief points in my paper:

True angina pectoris has long been separated from the nervous cases, or "pseudo-anginas;" it has been regarded as due to stenosis of the coronary arteries and as analogous to certain premonitory signs of dry gangrene, due to stenosis of arteries in the extremities. In the present paper I do not pretend to have discussed these questions in their entirety, but have confined myself to the rôle played by muscular cramps in relation to the other phenomena. In this paper it is maintained that muscular cramp does not take any necessary part in angina pectoris or in the phenomena preceding senile gangrene in an extremity, but that cramp is likely to occur in any muscle where an accumulation of waste products takes place, whether this accumulation be caused in healthy muscles by rapid catabolism due to excessive exercise, or by insufficient removal of the waste products in cases of disease due to stenosis of the main arteries and consequent diminution of the blood-stream through the affected part. It is further held that these cramps, when they do occur in angina pectoris, are expressed by the syncope, which may accompany the attack and lead to a fatal termination.

[1] See Dr. Lauder Brunton: "Nitrite of Amyl in Angina Pectoris," Clin. Soc Reports, February, 1870, vol. iii.

[2] Huchard, op. cit., pp. 798-847.

COMPOUND TINCTURE OF COAL TAR.

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The preparations of coal tar, in the form of tinctures, from a pharmaceutical standpoint, are not well understood. When they are prescribed the pharmacist dispenses either a preparation of which he may hold the formula (and regards as his own property) or some proprietary article, and so labelled. In some cases the preparation dispensed proves to be indifferently made or valueless, in other cases (as the writer knows from experience) to be positively harmful. In this communication will be given the results of a series of experiments made by Mr. J. M. Baer, apothecary, and the writer, which were undertaken with the view of obtaining the most desirable and elegant pharmaceutical and therapeutical preparation for external use. It is not necessary to refer to all the numerous formulæ considered. It will suffice if the more important are mentioned, the object being to introduce a good local remedy together with the working formula, so that it may in a measure supplant certain similar proprietary preparations and be brought within the reach of all. This article, therefore, may be regarded as an abstract of the work done.

It may be stated that the more valuable published formulæ of the so-called coal-tar tinctures may be divided into two groups: (1) those containing alkalies, and (2) those made with tincture of quillaia bark or tincture of elm bark. Some of them are old, and have been published and republished, more or less accurately, chiefly in foreign journals, while others are modifications of them. The literature on the subject, however, is meagre and unsatisfactory, so that any contribution to the subject must be welcome. The experiments made may be classed into those which contain:

1. Coal tar and alcohol.
2. Coal tar and potassa or soda.
3. Coal tar and tincture of quillaia.
4. Coal tar and tincture of elm.
5. Coal tar and tincture of quillaia, potassa or soda.

Some of these may be briefly referred to before presenting the formula selected as being the best. The object desired was a good product pharmaceutically, containing the therapeutic virtues of coal tar, and in particular a product miscible with water.

A simple formula, but one not to be recommended, consists of coal tar, 10 parts; alcohol (95 per cent.), 24 parts. Diluted with water 1 : 8, this forms a dingy, orange-yellowish, densely cloudy mixture, manifestly not homogeneous; an oily substance variegated in color floats on the surface

and adheres to the sides of the glass test-tube. The addition of water causes an oil or oily products to be separated, thereby rendering it an undesirable mixture, both pharmaceutically and therapeutically. This product is sometimes dispensed when "tincture of coal tar" is called for, but it is a mischievous fluid, liable to set up a dermatitis, for the reasons given.

The action of caustic soda and potassa on coal tar is to emulsify it, but emulsification occurs only when strong solutions are employed. Upon the addition of water the mixture becomes cloudy and the coal tar separates. This fact was pointed out by Le Bœuf.[1] McCall Anderson,[2] many years ago, in speaking of the value of tarry preparations in eczema, gave the following formula for an emulsion, which he stated had the advantages of being both serviceable and cheap:

R.—Coal tar	. . . . .	℥ij.
Alcoholis	. . . . .	℥ij.
Cola et adde		
Liq. ammon. fort.	. . . . .	♏viij.
Glycerini	. . . . .	ʒvj.
Aq. dest.	. . . . . ad	℥xij.

This formula makes an opaque, milky, dirty-brownish emulsion, which can be further weakened with water in all proportions. It forms no precipitate. The amount of glycerin seems to the writer to be unnecessarily and objectionably large. Diluted one part to fifteen of water, it is slightly cloudy and of a light brownish-yellow color. Owing to the small amount of alcohol it contains, it is a weak preparation and one which requires less dilution than the other formulæ mentioned.

The action of a caustic upon coal tar is illustrated in the following formula, containing tincture of elm, which has been published as a desirable formula: Take of coal tar, ℥ij; solution of caustic potassa, 5° Beaumé (5 per cent. solution) (℥j–℥ij), sufficient to make a thick, grayish mass. Stir and allow to stand, stirring frequently for several days. Pour off the liquid and mix with one gallon of tincture of elm (one pound to a gallon). This is an alkaline solution, containing about five grains of caustic potassa to the ounce. Diluted with water 1 : 8, it produces a clear, brownish solution with a precipitate. Upon the whole, the results obtained with the many formulæ containing coal tar and alkalies were not satisfactory, most of the products when water was added showing more or less precipitation.[3]

Reference may now be made to the action of tincture of quillaia on coal tar. Le Bœuf, in France, about 1860, was the first to make use

[1] Pharmaceutical Journal, 1866-67, second series, vol. viii., p. 470.

[2] Treatise on Eczema. Second edition. London, 1867.

[3] It will be borne in mind that coal tar only, and not wood tar, was employed in the experiments, wood tar, as is well known, combining with potassa and making a homogeneous mass, miscible with water.

of this combination under the name of "coal tar saponiné," of which further mention will be made presently. Before taking up the action of tincture of soap-bark on coal tar, the manner of preparing the tincture of soap-bark itself may be discussed, as there exists considerable variation in the several published formulæ. Some are made with alcohol, 57 per cent., others with 95 per cent. strength, and the proportion of bark also varies. The London and Westminster Hospitals (according to *Squire's Pharmacopœia of the London Hospitals* for 1891) give this formula (which is 1 : 4):

Quillaia bark (inner) bruised	℥v.
Alcohol, 90 per cent.	℥xx.

Heat to ebullition and filter.

Guy's Hospital gives the following:

Quillaia, coarse powder	℥iv.
Rectified spirit	℥xx.

This formula contains somewhat less of the bark (1 : 5). The British Pharmaceutical Conference adopted the formula of 1 : 8. Le Bœuf makes a strong tincture—1 part of coal tar to 4 parts 90 per cent. alcohol. Our own experiments show that a strong tincture, 1 part to 4, 95 per cent. alcohol, is the best, and this may be accepted as a standard.

The tincture of quillaia acts favorably upon coal tar, diluted with all proportions of water, forming a homogeneous emulsion. There is no other substance, so far as I am aware, that is able to take its place. Tincture of elm acts similarly upon coal tar, but less satisfactorily as concerns its emulsifying property. It does not possess the cleansing properties of soap-bark. The following formula is that given by Hans Wilder:[1]

Tincture of quillaia	4½ pints.
Coal tar	2 pounds.

Digest eight days and filter.

The tincture of quillaia is to be made by percolating two pounds of soap-bark with one gallon of 65 per cent. alcohol. Diluted 1 : 8, it produces a densely clouded solution of a yellowish-brown color, with a slight precipitate. It is a weak preparation, owing to the small amount of alcohol it contains, and it is doubtful if all the virtues of the coal tar are extracted.

Coal tar saponiné, according to Le Bœuf's formula,[2] is prepared as follows:

Soap-bark, crushed	1 part.
Alcohol (90 per cent.)	4 parts.

Heat to boiling and filter.

[1] Pharmaceutical Era, March 1, 1892.

[2] Pharmaceutical Journal, 1866-67, second series, vol. viii. p. 470.

Of this tincture take twelve parts, and digest for eight days ten parts of coal tar. It is a stable preparation and is miscible with water. Diluted with four parts of water, it constitutes the preparation labelled "coal tar saponiné," ready for use, pure or diluted as may be required. Alcohol of 95 per cent. strength we find makes a better preparation than the 90 per cent. alcohol Le Bœuf's original formula calls for.

The preparation known as "liquor carbonis detergens," manufactured by Wright & Co. as a proprietary article in England, is probably in like manner made with soap-bark. Its properties are much like those of the formula published at the close of this article. Therapeutically it appears to be the same. As a substitute for it the British Pharmaceutical Conference adopted in the unofficial formulary the following formula. Take of

Soap-bark, powdered	℥ij.
Alcohol (57 per cent.)	Oj.

Moisten the powder and macerate for twenty-four hours in a closed vessel. Then pack in a percolator and gradually pour on the alcohol. To this add prepared coal tar four ounces. Digest at a temperature of 120° F. for two days; allow to become cold and filter. (Prepared coal tar is commercial coal tar which has been exposed in a shallow vessel to a temperature of 120° F. for one hour, stirring frequently.) Mixed with water 1:8, we find it produces a slight precipitate, the mixture being somewhat milky, and of a pale brownish-yellow color.

Conclusions.—Summing up the result of these investigations, we may conclude:

1. That the best tincture of coal tar is made with the aid of tincture of quillaia.

2. That the strength of the tincture of quillaia should be 1:4, with 95 per cent. alcohol.

3. That the coal tar (1 part) should be digested with the tincture of quillaia (6 parts), with frequent agitation, for not less than eight days, and preferably for a longer period, and finally filtered.

4. The resultant product is a brown-black, clear tincture, which upon the addition of water forms a cleanly yellowish emulsion, the color and certain other characters varying with the kind of coal tar employed.

5. The tincture is stimulating, and is prescribed usually largely diluted, with from 10 to 60 parts of water, as a wash, and is useful where tar is indicated, as in certain forms of eczema, psoriasis, pruritus, and in other inflammatory diseases of the skin. It is often more useful when employed weak than strong.

6. This preparation, which may be designated as "compound tincture of coal tar," takes the place of several similarly composed proprietary preparations known as "liquor carbonis detergens" and "coal tar saponiné."

EIGHT CASES OF BERI-BERI.

By Henry C. Boenning, M.D.,
QUARANTINE PHYSICIAN OF THE STATE OF PENNSYLVANIA.

On November 8th information reached me that a number of the crew of the steamship Lanark, lying at Pier 30, Bainbridge Street wharf, were ill, and upon visiting the vessel I found six men of a large Hindoo crew prostrated with symptoms pointing to beri-beri. I found the ship to be a fine large vessel, well appointed and officered, tight, and in good sanitary condition. She loaded at Java five thousand tons of coarse sugar and sailed for Perim, where she arrived twenty days later, having had two deaths aboard during the passage. After leaving Perim she reached Port Saïd in seven days, having had another death on board, and two men, who were then sick, were taken ashore and placed in the hospital, but died before the vessel left Port Saïd, the Lanark being detained there twelve days. After leaving Port Saïd she sailed for Philadelphia, touching at Algiers and Gibraltar; had no more deaths aboard and arrived here November 2, 1893. An examination of the vessel by Drs. Cleaver and Seymour at the State Quarantine Station, proved that she was in good sanitary condition with no apparent serious illness aboard.

The Bill of Inquiry required at the Station reads as follows:

1. What is the name of this vessel? Lanark.
2. What is the rig of the vessel? Steamship.
3. What is the name of the commander? W. B. Cross.
4. From what port did she start on this voyage? Java, Sourabaya.
5. When did she clear this port? August 18, 1893.
6. What is her tonnage? 1973.
7. To what port does she belong? Liverpool, Eng.
8. How many men, all told, compose your crew? 60.
9. How many passengers have you? 5.
10. How many passengers are foreigners? 5.
11. Are all the passengers you have taken on board now on board of your vessel? Yes.
12. Where were the passengers taken on board? Cardiff, Wales.
13. Have you had any sickness on board since the commencement of this voyage? Yes; three died during the voyage, of malarial fever.
14. Are all now on board in good health? Yes.
15. At what port or places did your vessel touch or trade during the voyage, and at what time did she leave each of them? Perim, Sept. 11th; Port Saïd, Egypt, Sept. 31st; Algiers, Oct. 8th; Gibraltar, Spain, Oct. 11th, 1893.
16. Did any sickness prevail in the harbor, or on shore, or at any of said ports or places? None.

17. Of what does your cargo consist? Sugar.

18. To whom is your cargo consigned? Franklin Sugar Refinery.

19. To whom is your vessel consigned? R. R. Sneden.

20. Have you a bill of health? Yes.

21. Has any person boarded your vessel since you entered the Capes? None.

22. Has any person left your vessel since you entered the Capes? None.

23. Have you any rags or waste aboard? None.

Upon closer inquiries I found that the men who died all presented similar symptoms: great weakness and emaciation, paresis of the lower extremities, amounting in two cases almost to paralysis; considerable epigastric distress, some vomiting, and more or less œdema of the legs. The fatal cases all died rather suddenly. None of the cases had chills or fever; they simply became weak, dragged their legs, complained of much epigastric soreness, had considerable palpitation and some shortness of breath, fugitive muscle pains, and more or less dropsy.

On November 9th I visited the vessel again and carefully examined the crew. I found six men presenting marked symptoms of the disease. I immediately ordered the entire crew to be isolated and instructed the ship's officers not to allow any visitors aboard the vessel, nor to allow those engaged in unloading the vessel to come in contact with the crew; for I was informed that shortly after the vessel had reached her dock, two men, too ill to work, were sent by the direction of Dr. Rudderow, physician to the British Consulate, to the Medico Chirurgical Hospital, where one died suddenly.

I confess I was much impressed by the facts as I found them. A disease unknown to me in a practical way, affecting twelve persons, of whom six died, a mortality of 50 per cent., decided me to adopt prompt and effective measures, and I ordered the vessel to be taken on Saturday, November 11th, at 12 o'clock, to Quarantine Station, to be treated, her crew to be removed as suspects, and the sick to be sent to the hospital. Friday evening, November 10th, an interview, attended by Health Officer Veale, Mr. Clipperton (British Consul), Captain Cross, and the Quarantine Physician, resulted in a plan, to which all agreed, to permit the vessel to remain at her dock or in stream, to remove the crew to the Quarantine Station at the expense of the ship's representatives, and to burn the bedding and soiled effects of the crew. I immediately telephoned to Dr. Cleaver to report the next morning on board the Lanark and to direct the proper cleansing of the vessel, the instructions being, to have the vessel mechanically cleansed, then drenched with bichloride 1 to 500, and after this to fumigate for twenty-four hours with sulphur dioxide, burning not less than three pounds to every 1000 cubic feet of space. The bedding and soiled effects of the crew were burned. The

work of cleansing the vessel occupied three days. On Saturday afternoon November 11th, thirty-nine of the crew, consisting of firemen, sailors, and stewards, were received at the Station. Of these, eight were found to be sick. They were given a hot bath and then immersed in a 1 to 1000 solution of bichloride, given clean clothes, and sent to the hospital. Thirty-one were housed as suspects in the barracks, but were first given a bath, immersed in a 1 to 1000 bichloride solution, and put into clean clothes. On Sunday, November 12th, I began a careful study of the cases in the hospital.

CASE I.—Mohammed Hafiz, aged thirty-five years, began to feel sick some time in October. He lost flesh, had pains in his body, but was not incapacitated for work until after the vessel had been in port for several days, when his legs began to swell and feel very heavy. His condition on November 12th was as follows: More or less emaciated, weak, and he walked with some effort. His deltoids were sore to the touch and he had considerable muscle soreness through the posterior muscles of the legs. His tongue was very red, beefy; the cardiac area enlarged, both transversely and vertically; rapid but irregular heart action; at the base a well-marked systolic murmur, soft in character, best marked over the tricuspid cartilage. No evidence of pulmonary, hepatic, or splenic involvement. Considerable epigastric tenderness. Cutaneous reflexes absent on the sides of the feet and palms of the hands. Large areas of cutaneous anæsthesia involving the skin of the dorsum of the forearm in both arms, and in the right extending over the shoulder. Entire abdomen below umbilicus anæsthetic. The skin over the dorsum of the foot and anterior and upper lateral surfaces of the leg in both lower extremities insensitive to the prick of a needle or to the application of intense cold or heat. The patellar and ankle reflexes were impaired.

A curious symptom in this case was unilateral sweating. This patient's right arm and the right side of the face were constantly covered with a profuse sweat. An examination of his blood showed a deficiency in the number of red corpuscles, a slight increase in the white; a diminished tendency for the corpuscles to form rouleaux; they seemed to have a tendency to aggregate in scale-like groups, but no foreign elements were observed. The urine showed neither albumin nor sugar, but an abundance of phosphates; it was neutral in reaction and had a specific gravity of 1022. Under treatment this man progressively improved and was discharged, practically well, ten days after admission.

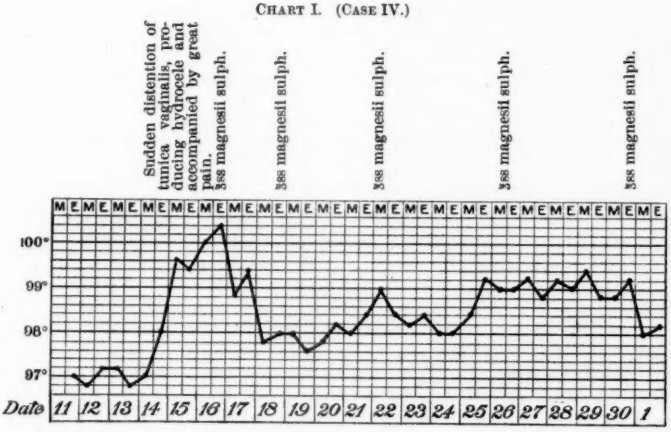
CASE II.—Abdulla Hamed, aged twenty-five years, has been ailing for about two months. Has complained of great weakness in the legs and much soreness of the muscles. He lost flesh rapidly and shows decided atrophy of the anterior muscles of the legs. On admission to the hospital he had a soft systolic murmur, most distinct over the pulmonary artery. He has frequent attacks of palpitation during which the heart rhythm is disturbed. He has considerable epigastric tenderness, some nausea and vomiting, principally of mucus, and occasionally after taking food. No apparent liver or splenic enlargement and but very slight œdema about the malleoli. His urine showed neither albumin nor sugar, and had a specific gravity of 1016. He was hyperæsthetic about the lips and right side of the face; the left side of the face was devoid of sensation. He also presented anæsthetic areas over the ante-

rior and lateral regions of the legs and dorsal surfaces of the feet. His reflexes were well marked, in fact exaggerated. His blood was markedly hydræmic. He was discharged ten days after admission, convalescent.

CASE III.—Sad Bedad, aged forty years; a well-built man. My attention was called to this man on account of the apparent paralysis of the flexor muscles of the feet. I observed that as he walked along the floor he raised his heels very high, dragging his toes. On admission to the hospital he was found to have a well-marked, but soft, systolic murmur transmitted through the tricuspid orifice, but most distinct over the third left intercostal. He had considerable epigastric tenderness; no apparent involvement of the lungs, spleen, or liver; some soreness or tenderness in the right inguinal region, and frequent watery stools. His urine showed neither albumin nor sugar and had a specific gravity of 1026. He had marked dropsy of the legs. There was loss of sensation of the surface of the arms as high as the deltoids, over the præcordia, lower part of abdomen, anterior part of thighs, over the anterior and lateral regions of the legs and the dorsal surface of the feet. He has strongly exaggerated patella and foot reflexes; a tap over the right tendo patellæ produces an almost convulsive response. His blood showed no parasites. He was discharged on November 20, 1893, much improved.

CASE IV.—Saliman Ali, aged twenty-one years, was decidedly weak, his legs were very œdematous, he had much dyspnœa, and presented a double cardiac murmur, irregular heart, pulsating jugulars, throbbing carotids, had diarrhœa, and extensive nerve disturbances. Two days after

CHART I. (CASE IV.)


Sudden distention of tunica vaginalis, producing hydrocele and accompanied by great pain.
3ss magnesii sulph.
3ss magnesii sulph.
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M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E
100°
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98°
97°
Date 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 1

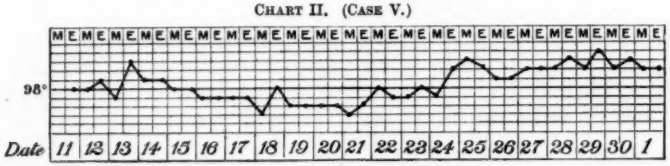
admission this man exhibited a sudden serous effusion into the tunica vaginalis. He also became anasarcous and very short of breath. A careful physical examination showed some pulmonary œdema, a marked enlargement of the cardiac dulness, irregular ventricular action, a strong but soft mitral murmur, a very well marked tricuspid murmur, a well-defined tremor or thrill over the præcordia, and pulsation of the external jugulars. His neck was somewhat œdematous. He had a cough and occasionally raised some frothy mucus slightly tinged with blood. In

this case there was an entire absence of regularity in the action of the auricles and ventricles; the ventricles contracted independently of each other. The nerve disturbance was marked. There was anæsthesia over the upper lip, the lower lip was hyperæsthetic. The right upper extremity presented small areas of anæsthesia; the skin over the entire left upper extremity was devoid of sensation. There was an entire loss of the tactile sense. The abdomen was hyperæsthetic. The skin along the inner side of the thighs and anterior and outer side of the legs was anæsthetic, but a very deep puncture (half an inch) was felt. There was an entire loss of reflexes, including the cutaneous of the sole and palm. The blood was hydræmic, aplastic, and presented variously sized and shaped corpuscles, but no parasites were observed. (See Chart I.)

CASE V.—Seh Mohammed; has been sick for two weeks. On admission his tongue was seen to be covered with small necrotic patches; the intervening areas were very red, beefy, and deeply fissured. He had a soft mitral systolic murmur and complained of much pain over the heart. After a few days' rest in bed, this patient was re-examined and found to have considerable palpitation, shortness of breath, and a blowing systolic murmur most distinct over the third left intercostal space, also a faint diastolic murmur most distinct in the left fifth intercostal space.

On November 16th, when again examined, the heart was acting rhythmically, and presented a murmur heard most distinctly during the ventricular diastole and over the ensiform appendix. Since November 27th all cardiac murmurs have disappeared. There is some epigastric tenderness, great soreness of muscles, and rapid emaciation. He shows slight œdema of the legs and over the sternum. There is some enlargement of the spleen and an antecedent history of malarial disease. The superficial nerve disturbances in this case are curious. On admision I transfixed the lips with a sharp needle without producing any response. The

CHART II. (CASE V.)



lips and face were profoundly anæsthetic. Six days later exquisite hyperæsthesia developed in these regions. The patient could not tolerate the touch of a spoon to administer his medicine. The skin of the hands and feet is insensitive. This patient can flex the toes, but is obliged to extend them by the hand when ordered to straighten them out. His reflexes are diminished. His blood shows no special changes. The urinary examination was negative. (See Chart II.) Discharged December 2, 1893, apparently well.

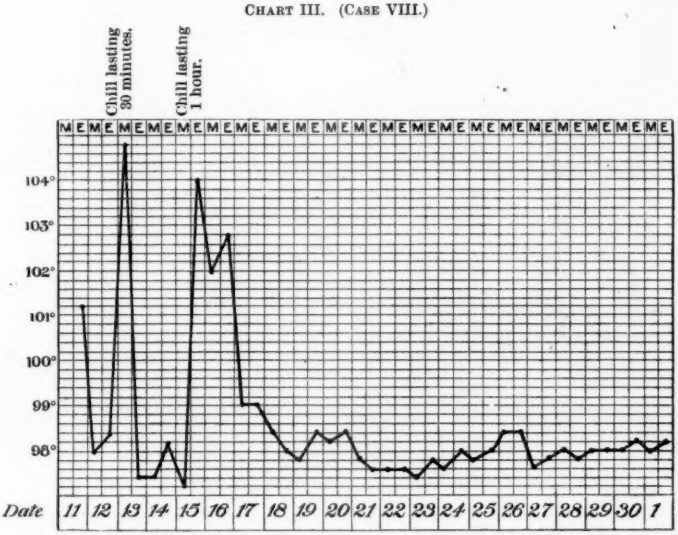
CASE VI.—Sala Abdul, aged twenty-five years, a strongly built man, has been sick for a week with pains in his muscles, palpitation, and sudden dropsy of the body. The skin over the trunk and the legs pits readily under pressure. He has a soft systolic murmur most distinct over the aortic cartilage. Has considerable diarrhœa, pain in the head, and aching in the muscles of the calves. He walks in a staggering manner. Has marked enlargement of the spleen, pronounced anæsthesia over the ex-

tremities. No antecedent history of malaria. Urine examination negative. The blood does not show any special changes and no crescents. Discharged November 20, 1893, convalescent.

CASE VII.—Mahmood Abdul, aged twenty-four years, has been sick for a month with muscle pains and diarrhœa. On admission was found to be very weak, the muscles of the legs markedly paretic and sore to the touch. There is no œdema, no enlargement of the spleen, a feebly acting dilated heart, and considerable dyspnœa. Patellar and cutaneous reflexes are absent. A soft murmur, most pronounced over the ensiform appendix, and coincident with cardiac diastole. There is a curious blending of anæsthetic and hyperæsthetic areas over the surface of the extremities. The urine shows neither albumin nor sugar. The blood shows no special change. Discharged November 20, 1893, convalescent.

CASE VIII.—Belali Saliman, aged twenty-seven years, has had difficulty in walking since about the middle of September. He is weak and emaciated. Has had chills and fever. His legs are slightly œdematous. Has a very distinct diastolic murmur, soft in character, best heard over the ensiform appendix; has a decidedly large spleen, and slightly enlarged liver. His urine contains a trace of albumin. He has marked abdominal

CHART III. (CASE VIII.)


Chill lasting 30 minutes.
Chill lasting 1 hour.
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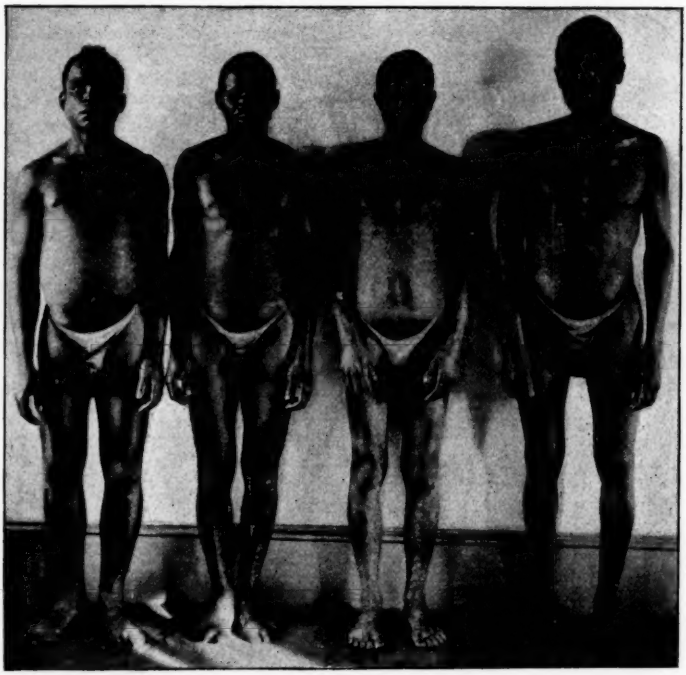
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 1

tenderness, nausea, and some vomiting. On the morning of November 13th he had a pronounced chill, which was repeated on November 15th. At the appearance of the first chill we began the free administration of quinine, the effect of which, however, did not become plainly manifested until November 15th or 16th. (See Chart III.) This man exhibited in his blood the hæmatozoon of malaria and also profound changes in the corpuscular elements. His nerve disturbances have been marked. He presented areas of anæsthesia over the extremities,

abdomen, and pectoral regions, interspersed with areas of hyperæsthesia. Nor did these remain constant, for the areas of insensibility became, after the lapse of twenty-four to thirty-six hours, hyperæsthetic.

Numerous trials with the battery were made in the cases and all showed, over affected muscles, changes in their electrical reactions.

I herewith present photographs of the patients, some of whom show the lesions of the disease plainly, and I also attach some of the temperature charts.



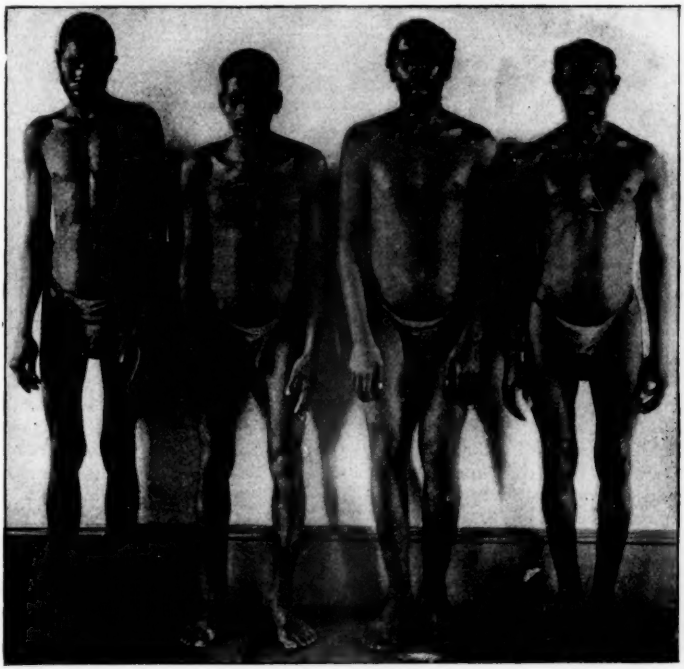
Saliman Ali. Sad Bedad. Abdulla Hamed. Mohammed Hafiz.

The treatment of all these cases was rest in bed between blankets, a full and sufficient diet, to which were added for each man two to three pints of milk per day. The medication consisted of the administration of strychnine, $\frac{1}{60}$ to $\frac{1}{60}$ grain three times a day; infusion of digitalis, $\frac{1}{2}$ ounce three times a day, and the free use of sulphate of magnesia. In Case VIII., owing to the intercurrent tertian intermittent, twenty grains of quinine daily were given, with marked effect on the malarial trouble.

This disease has very infrequently been observed, if ever at all, in

American ports; certainly no such opportunity for investigation and study as we have enjoyed has ever before been met in this country.

The questions which especially interest us as a quarantine body are to determine the probable cause of this disease and its degree of contagiousness. I believe that it is due to a special and specific poison, which produces a profound effect on the sympathetic, especially of the ganglia of the heart. Hence the cardiac disturbances, the nutritive changes, and the rapidly developed serous effusion. I believe the disease to be feebly



Belali Saliman. Mahmood Abdul. Sala Abdul. Seh Mohammed.

contagious; of this we have had practical demonstration on the Lanark The two men who died on board on the voyage from Java to Perim undoubtedly brought the disease aboard. The occupant of an adjoining bunk next took the disease, and thus it spread through the vessel's starboard forecastle from bunk to bunk—not in a rapid, but in a slowly progressive manner. Those who occupied the port forecastle escaped infection until near the end of the journey, when one or two became ill; but the firemen of the vessel, who occupied the starboard forecastle, constituted the larger number of those affected. A remarkable fact bearing

on the contagiousness of the disease is the infection of certain Arabs who came on board at Port Saïd. From all accounts, these people were in the best of health at the time they were shipped, but two of them, at least, were among those most profoundly affected with the disease. They were assigned bunks in the starboard forecastle. I would like to add a word about the heart murmurs. They had disappeared in the majority of cases at the time the convalescents left the hospital wards.

As these patients were almost all entirely ignorant of the English language, our study of them presented especial difficulties.

I wish to add that I was most ably assisted in my work in the study of this disease by Drs. Cleaver and Seymour. Dr. Howard S. Anders, of this city, made a series of very careful blood examinations of the patients, and Dr. Judson Daland also made investigations of the blood of Cases IV., V., and VIII. Both reports are of the greatest scientific interest and merit.

Report of Dr. Howard S. Anders on the Blood.

Two of the cases the blood of whom I examined were quite ill of the disease, occupying beds Nos. 4 and 8 (Cases IV. and VIII.) respectively; the third—the occupant of bed No. 7 (Case VII.)—was convalescent.

In the examination, attention was directed particularly to ascertaining the corpuscular richness of the blood, and with a view to discovering any microphytes in the fresh specimen.

At the outset it was remarked, after puncturing the finger-pulp, that the oozing blood (Cases IV. and VIII.) was peculiarly hydræmic in fluidity, though not so in color appearance; in other words, while its redness was fairly good, its plasticity was lacking out of all proportion, the blood from the moment of exit running unusually freely and rapidly in the cutaneous furrows.

The microscopic confirmation of this relatively increased blood diffluence was then observed in the apparent aplastic state of the red copuscles. Instead of joining to form rouleaux, the disks, with few exceptions, tend to place themselves singly, or in groups of twos and threes here and there. This behavior was absent in the blood of the convalescing patient (Case VII.). A count of red corpuscles (Thoma-Zeiss apparatus—480 diameters) showed approximately 3,950,000 per cubic millimetre of blood in Case IV.; there were 4,400,000 red corpuscles per cubic millimetre in Case VIII. On account of the marked fluidity of the blood, I was not able to obtain more than requisite to form a solution of 1 part to 200 of the salt solution.

In Case VII. there was no corpuscular anæmia; the blood was about normal in plasticity, and a 1 per cent. solution was obtained with ease.

There was slight relative leucocytosis in the blood of Cases IV. and VIII. Very moderate hæmoglobinæmia was apparent.

Several micro- and megalocytes were noted in every field. A few poikilocytes were observed; also a point of interest was the finding of the plasmodium malariæ in all three cases. This would seem to indicate a more or less constant prevalence of malarial miasmata in the places inhabited or visited by the sailors.

The hæmatozoa occurred in two forms: the spherical, clear hyaline bodies, and the crescentic bodies—both within the corpuscles. A very few crescents were found in the convalescent case. The transformed hæmoglobin melanin in those corpuscles containing the crescentic organisms assumed a slightly irregular black rod or bacillar appearance at the borders between the organisms and untransformed homogeneous-looking hæmoglobin.

Result of the Examination of the Blood of Three Cases of Beri-beri at the Quarantine Station, Essington, made by Dr. Judson Daland on November 27, 1893.

I. Seh Mohammed (Case V.), aged forty years. The color, consistence, and coagulability of the blood appeared normal as it exuded from the puncture. The red corpuscles were normal in size, but showed no microcytes, megalocytes, or poikilocytes. There was a moderate grade of leucocytosis, and the white corpuscles numbered 30,000 per cubic millimetre. Many of them were remarkable for their gigantic size, and contained large coarse granules, not unlike the eosinophile cells, and the large white corpuscles that are so frequently observed in leukæmia. Blood plaques were present in moderate numbers. Careful search was made for the plasmodium of malaria and other micro-organisms, but none was discovered. The Thoma-Zeiss hæmocytometer was employed in counting the red blood-cells, which numbered 4,750,000, and Fleischl's hæmometer gave 65 per cent. hæmoglobin.

II. Belali Saliman (Case VIII.), aged twenty-one years. The blood, as it exuded from the incision, seemed rather more liquid and paler than normal. Its coagulability was unchanged, but the red corpuscles were of great variety as regards size. A few were larger than normal, and many were only half the diameter of the normal cell. There were a moderate number of microcytes, but there was no tendency to poikilocytosis. There was a moderate grade of leucocytosis, and the white corpuscles numbered about 40,000. They, too, varied in shape, some being as small as microcytes, and many of them were coarsely granular, resembling eosinophile cells. The Thoma-Zeiss hæmocytometer showed that there were 4,400,000 red corpuscles per cubic millimetre, and a careful count of the microcytes showed that there were 400,000 per cubic millimetre. In counting the microcytes all red cells having a diameter of one-half, or less than the normal diameter for red blood-corpuscles, were counted as microcytes. Many of these were mere round points, but their true character was made clear by the color given them by the hæmoglobin present. Fleischl's hæmometer gave 60 per cent. of hæmoglobin. Careful search was made for the plasmodium of malaria, and for other micro-organisms, but none were observed.

III. Saliman Ali (Case IV.), aged twenty years. The blood from the puncture was normal in color, consistence, and coagulability. Microscopically the red blood-cells were normal in size and shape, with the exception of a few microcytes and an occasional megalocyte. To the naked eye the red blood-cells appeared normal in color, though Fleischl's hæmometer showed but 60 per cent. hæmoglobin. The white corpuscles were normal in size, number, and appearance. The Thoma-Zeiss hæmocytometer gives 4,575,000 red corpuscles per cubic millimetre. No plasmodium of malaria, nor other parasitic micro-organisms, were observed.

REMARKS.—It is to be observed in these blood examinations that two or three of the cases showed a moderate grade of leucocytosis, varying from 30,000 to 40,000, and that one of them showed a large number of gigantic leucocytes; two of them showed numerous white corpuscles containing large coarse granules. Case II. is also especially interesting from the extraordinary number of microcytes—that is, 400,000—many of which were remarkable for their minute size. Case III. shows a few microcytes and megalocytes. It is also interesting to note the want of proportion between the number of red corpuscle cells and the amount of hæmoglobin, resembling, in a slight degree, the results obtained in the examination of blood in cases of chlorosis. In each of the three cases the number of red blood-cells was slightly less than normal. This examination of the fresh living blood is also of interest from the absence of parasitic micro-organisms, though careful search was made in the hope of finding the plasmodium of malaria, or some like parasite, or some other form of low animal life. These microscopic examinations were conducted with the aid of the Zeiss microscope, using the apochromatic ocular No. 6, and the apochromatic oil-immersion objective $\frac{1}{12}$.

This incident was the sole unique and novel manifestation of the microscopic investigation, and the only feature carrying with it the suspicion of a possible etiological relation to this interesting endemic disease of Asiatic climes, beri-beri. Further than the above results there were no evidences of any blood parasites whatever.

On the morning of December 23d, in compliance with instructions received from the British Consul, Mr. Clipperton, the two patients detained at the Quarantine Station were delivered to the Medico-Chirurgical Hospital. As the question was raised at our last meeting by Dr. Lee, whether there was any possibility of the existence of trichinosis in these cases, a careful examination was made of the muscular fibres, with negative results. The fibres were, however, found to be granular. Examination of the blood of the patients by Dr. Dixon was likewise negative.

I have the pleasure to report that all of these cases made a good recovery, although the prognosis in at least two was very doubtful. A clinical fact of much interest was the disappearance of the symptoms and signs of the cardiac lesions. At the time of the discharge of the patients the heart in each case showed no evidence of the apparently serious lesions present during the course of the disease.

THE CULTIVATION OF THE TETANUS BACILLUS.

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It is generally conceded that the tetanus bacillus is one of the most difficult organisms to cultivate; not because it is strictly anaërobic, nor because it does not readily develop upon the usual culture media, but rather, perhaps, because it is always associated with other organisms from which it is no easy matter to isolate it. The usual method of separating a given organism from a mixed culture, namely, the plate-culture method, is also recommended for obtaining pure cultures of the tetanus bacillus; but although it may be a simple matter to plate this organism, the writer has never succeeded, in spite of many attempts.

Kitasato's method ("Ueber den Tetanus Bacillus," *Zeit. für Hygiene*, Bd. vii.) of obtaining pure cultures of tetanus bacilli is as follows: The pus from the wound in cases of traumatic tetanus is spread over the surface of blood-serum or agar-agar, and the tubes are then placed in the thermostat at 37° C. Within twenty-four hours the organisms contained in the pus begin to develop, and microscopic examination reveals, among the other bacteria, a few tetanus bacilli containing end-spores. After forty-eight hours tetanus bacilli with spores are very numerous. Such a mixed culture is now placed in a water-bath, previously heated to 80° C., for three-quarters to one hour, which suffices to kill everything but the tetanus spores. Plate cultures are now made in special plating vessels, and these filled with hydrogen. In about ten days recognizable tetanus colonies have developed. Such colonies are described as resembling those of the bacillus subtilis; liquefaction occurs much slower, however, so that later this resemblance is lost. From these colonies pure cultures may be made by any of the anaërobic methods.

The method of Vaillard and Vincent consists in inoculating bouillon tubes with the pus, closing them from the air and keeping them at a temperature of 38° to 39° C. for from five to six days. These tubes, then containing many spore-bearing tetanus bacilli, besides other organisms, are heated for one or two minutes in a water-bath at 100° C., and plates or anaërobic cultures made. I have tried this method several times, but never with success; the spores seem to be always destroyed.

The first case of traumatic tetanus that I had the opportunity of examining bacteriologically was that of a dog[1] which died at the Royal

[1] It may be interesting to note here that the dog seems to possess almost complete natural immunity from tetanus. Möller observed only one case of general tetanus in fifty thousand sick dogs. In a like number Friedberger and Fröhner have never seen a case. Friedberger and Fröhner: Pathologie und Therapie der Hausthiere, Bd. ii. S. 636.

Dresden Veterinary School. A small puncture in one paw was the only wound to be found, and within this was an oat, which may have caused the wound or entered later. No pus being present, a platinum needle was rubbed about the inside of the wound, and the material thus obtained was spread over the surface of agar-agar tubes. Bouillon cultures were made with some of the same material, and the oat was rubbed over the surface of two oblique gelatin tubes. The bouillon and the agar tubes were placed in the thermostat, and the resulting mixed cultures were heated for three-quarters to one hour in a water-bath at 80° C., and then plated. There being, however, no glass vessels such as Kitasato used, and no Petri dishes, the usual plate cultures were made, and these placed in an atmosphere of hydrogen. The plates in some instances remained sterile —more often foreign organisms developed, but never a tetanus colony. Like results were obtained later when Petri dishes were used.

About five weeks after the tubes were inoculated the original gelatin tubes were examined. They had been kept at the room temperature, were liquefied, and contained, besides many other organisms, many tetanus bacilli with end-spores. One of these tubes was heated to 80° C. for half an hour, and then, instead of plates, fresh bouillon cultures were made, and these placed under hydrogen at 37° C. After forty-eight hours there was an excellent growth, and a microscopic examination on the fifth day revealed seemingly pure cultures of the tetanus bacillus. Plates made from these cultures and placed under hydrogen were no more successful than the previous ones.

A white mouse was then inoculated subcutaneously with a loopful of the other original gelatin culture. The animal died of tetanus in three days, and from the more or less firm bed of pus at the point of inoculation bouillon cultures were made and placed in hydrogen at 37° C. After forty-eight hours these bouillon tubes contained various bacteria, but among them many spore-bearing tetanus rods. Upon heating these cultures in a water-bath at 80° C. for three-quarters of an hour, making fresh bouillon cultures from them and placing these in hydrogen at 37° C. for forty-eight hours, pure cultures of tetanus bacilli were again obtained.

From this experience the following method was determined by which pure cultures of the tetanus bacillus may be obtained from cases of traumatic tetanus without the use of the plate-culture method:

The pus of the wound is transferred to decidedly alkaline bouillon tubes. If no pus is present, scrapings from the internal surface of the wound, or small pieces of tissue snipped from the same region, are used.[1]

[1] Tetanus bacilli are invariably found in the immediate vicinity of the wound or point of inoculation. In the organs their presence is exceedingly limited. Only once, when nearly the whole brain of a guinea-pig was employed in making cultures, did Vaillard and Vincent find the tetanus bacillus. Büdinger (Wien. klin. Wochenschr., 1893) claims that they are also

The tubes thus inoculated may be placed at once in the thermostat (36° to 39° C.), or first in a chamber which is filled with hydrogen, and then chamber and all is transferred to the oven.[1] It is also a good plan to inoculate one or two mice with like material, that there may be something to fall back upon in case the cultures should fail. After twenty-four hours the bouillon has become cloudy and a slight sediment rests at the bottom of the tubes; after forty-eight hours both cloudiness and sediment have increased. The cultures may now be taken from the thermostat and examined. Upon opening the hydrogen chamber one notices the peculiar and foul odor produced by the growing tetanus bacilli. Microscopic examination of the cultures reveals bacteria of nearly every form, but, as a rule, there are many spore-bearing tetanus bacilli among them, easily recognizable by their peculiar drumstick shape.[2]

If these organisms are present the tubes are placed in a water-bath already heated to 80° C., and kept at this temperature for three-quarters of an hour. As a rule, this is sufficient to kill all organism contained in the cultures except the tetanus spores.[3]

From these heated tubes one may, often with good results, inoculate at once some solid anaërobic culture medium; but since the development in bouillon is so rapid and luxuriant I prefer to inoculate fresh bouillon tubes at once. These tubes are then placed in the thermostat under hydrogen. After twenty-four hours the same cloudiness and sediment are observed, perhaps not so well marked as in the first instance, and the same disgusting odor. The bouillon soon begins to clear from above, and in a week or ten days is quite cloudless, the culture having sunk to the bottom, where it rests as a white sediment which becomes darker with age. These cultures are generally pure (a mixed culture usually

present in the lymphatic glands, but Schnitzler ("Zur Kenntnis des Tetanus," Centralbl. für Bakt. u. Parasit., Bd. xiii. S. 679) says this is only when there is mixed infection. According to Sanfelice (Zeitschr. für Hygiene u. Infektionskrankheiten, Bd. xiv. S. 357), tetanus bacilli may be demonstrated microscopically at the point of inoculation, but many preparations must be made before finding one bacillus, and they very seldom contain spores.

[1] Experience convinces me that in tubes well filled with bouillon (half-full or more) tetanus bacilli develop readily, whether in the presence of hydrogen or not, provided *other organisms* are also present. If only tetanus bacilli are present the growth is uncertain except under hydrogen. This was recently emphasized: Well-filled bouillon tubes were inoculated with tetanus bacilli, and, as usual, placed in the oven in an atmosphere of hydrogen. After two days no growth was visible, and an examination revealed a leak in the hydrogen chamber. This was remedied, again filled with hydrogen, and returned to the thermostat. After forty-eight hours there was a luxuriant growth in the same tubes.

[2] One must remember that drumstick bacilli found in such a preparation are not *necessarily* tetanus bacilli, for there are several other similar forms which may be found in such cultures, perhaps especially in those made from experiment animals inoculated with garden earth. The spore of the tetanus bacillus is *round* and much larger than the rather slender rod in which it rests.

[3] Kitasato says that the spores of other anaërobic bacteria found in tetanus pus are killed by this temperature in half an hour. One is occasionally troubled with other bacteria, however, sometimes with a bacillus bearing end-spores, and I was once unable to get rid of a coccus that withstood this heat for an hour.

but not always remains cloudy), but it is wise to prove their purity by inoculating agar, gelatin, etc. Although the entire culture has settled to the bottom, the bacilli are still motile, sometimes moving quite rapidly. In a bouillon culture two months old a sluggish motion was still visible, but in a very virulent culture ten months old I was unable to convince myself of actual motion.

This method has been successfully used many times by me, not only to obtain pure cultures of tetanus from experiment animals, but also from the two following cases of tetanus traumaticus.

The first case was that of a horse. The foot was brought to the laboratory, and after paring away the horn in the region of the nail thrust, small bits of tissue (there being no pus) were snipped out and transferred to bouillon. In this case two mice were also inoculated with similar bits of tissue which were introduced beneath the skin of the back just above the root of the tail. These mice died of tetanus, one in three and the other in five days, and from them, as well as from the foot, pure cultures of tetanus were obtained in the above-mentioned manner.

Recently, through the courtesy of the New Haven Hospital, I had an opportunity to obtain cultures from a fatal case of traumatic tetanus in a man. Marked spasms and trismus were just beginning. A platinum loop was inserted into the wound (situated at the back of the head) and with the material thus obtained bouillon cultures were made. By the same method of procedure pure cultures resulted.

I think this method may safely be recommended, especially if one has not some such vessels as were used by Kitasato at hand. It is quicker and simpler than the two methods referred to. Pure cultures may be obtained in four days, while by the other methods it takes at least ten, since colonies are not recognizable upon the plate before a week. It is, moreover, a surer method, for I must believe that it is no simple matter to obtain plate cultures of the tetanus bacillus. Furthermore, since mixed cultures must always be examined to ascertain the presence or absence of tetanus bacilli before further procedure, it is evident that a cover-glass preparation from an impure bouillon culture will show almost at a glance all the different organisms it contains, while it is equally true that this would not be the case if the preparation were made from an impure agar or serum culture, although a preparation from the water of condensation would give this result to a certain extent. Finally, the tetanus bacillus develops much more rapidly in bouillon than in agar or serum, so that after heating we have more bacilli to work with. In bouillon also we have a medium every part of which is more evenly and surely penetrated by the heat, and more easily manipulated.

In spite of the fact that it is not in accord with bacteriological methods to call anything a *pure culture* that is not derived from an

isolated colony, I must consider these cultures perfectly pure: First, because upon microscopic examination nothing but tetanus bacilli and spores are found. True the purity of such a preparation might be questioned, since it contains rods with and without spores, free spores, and spores re-developing into rods, besides numerous threads of various lengths—indeed, often of different sizes. These, however, are only different forms of the tetanus bacillus. Secondly, if mice are inoculated with such bouillon cultures they die of tetanus in from twelve hours to five days, and there is absolutely no change to be seen at the point of inoculation, or at most only slight hyperæmia. On the contrary, if an impure culture is inoculated, swelling, inflammation, pus, etc., are invariably present at the inoculation point. Thirdly, if material from such cultures is transferred to tubes containing agar, gelatin, etc., these tubes remain perfectly sterile. Finally, if from such a bouillon culture anaërobic cultures are made in gelatin containing grape sugar or any other reducing media, only the tetanus bacillus develops with its characteristic growth.

A few of the simpler anaërobic methods are as follows:

Gelatin. The tubes should be well filled with this medium, or the usual amount may be used, and after inoculation an equal quantity of melted gelatin poured upon it.

Gelatin with 2 per cent. grape sugar. In this medium the tetanus bacillus develops well as a rule. About the fourth day a cloudy, burr-like growth appears toward the centre of the gelatin. Soon numerous small gas-bubbles form, gradually pushing up the gelatin. The same vile odor is observed, and about the tenth day liquefaction begins. As this becomes complete the culture, containing mostly rods and threads, sinks to the bottom as a white mass. The growth is about the same in gelatin without sugar. According to Vaillard and Vincent, young gelatin cultures, *e. g.*, five to seven days old, are almost innocuous; a guinea-pig may receive with impunity one-fifth to one-half c.c. of such a culture. Gelatin cultures over ten days old, on the contrary, are very virulent.

An exceedingly good anaërobic method is as follows:

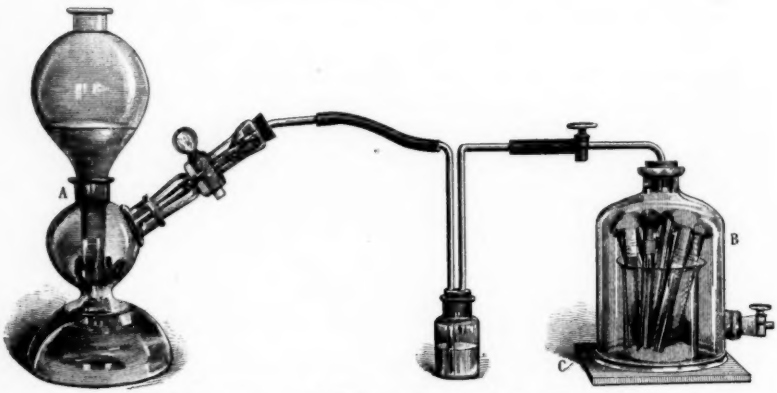
About 10 c.c. of *agar-agar gelatin* (agar, $\frac{1}{8}$ per cent.; gelatin, 5 per cent.) is placed in each tube. This medium has the advantage of being as clear as gelatin and may remain in the thermostat without liquefying. Having inoculated a tube of this medium with the desired anaërobic organism, the cotton plug is cut off at the top and pushed into the tube till it nearly touches the surface of the medium. A second plug is then inserted into the tube till it nearly touches the original plug. This second plug is then saturated with pyrogallic acid solution,[1] and finally

[1] Pyrogallic acid, 1 gramme; 10 per cent. caustic potash solution, 10 c.c.

a third plug is fitted into the mouth of the tube and covered with paraffin.

Agar-agar may be used in any of the ways spoken of, or agar-agar with 5 per cent. formic acid; but owing to its usual cloudiness it is not as satisfactory as a clear medium. Oblique agar has been recommended for growing anaërobic organisms. After inoculation the cotton plug is removed, the tube filled with hydrogen and again plugged, but with a rubber stopper smeared with paraffin.

According to Sanfelice (*Zeitschr. für Hygiene u. Infektionskrankheiten*, Bd. xiv. S. 346), it is unnecessary to use a reducing agent, and only a small amount (5 c.c.) of the culture medium need be placed in each tube, if the medium is taken directly from the sterilizer and hardened as quickly as possible. The heat expels all the oxygen from the medium, and, cooling it quickly, shuts it out. It gradually enters again, but not for several days, and before this time most anaërobic organisms have had time to develop, especially toward the bottom. He thinks that many failures to grow anaërobic organisms in media without the use of reducing agents may be referred to the fact that the media has been exposed to the air for a long time.



A. Hydrogen generator. B. Hydrogen chamber. C. Ground-glass plate.

Perhaps a few words regarding a hydrogen chamber may not be out of place. A simple chamber consists of a bell jar with an opening at the top and another near the bottom, for the entrance and exit of the hydrogen. Rubber stoppers, through which run glass tubes supplied with stopcocks, fit tightly into these openings. The jar is placed in a dish containing a sufficient amount of liquid paraffin or mercury, and filled with hydrogen. The writer uses at present such a bell jar fitting tightly to a glass plate, the contact surfaces being ground. (See figure.) Such a

chamber is perfectly air-tight, especially if a little vaseline is placed between the two surfaces.

In conclusion, the method described above seems to me practicable and simpler than methods hitherto described. The organism is at best a most troublesome one to work with, and simple as this method sounds, the experimenter may find that many attempts must be made before successful results are obtained. Of four or five bouillon tubes, for instance, inoculated with tetanus-wound material, perhaps only one will give pure cultures after heating, perhaps none; in some cases again, all. It is therefore always advisable to also inoculate mice, that one may have fresh material in case the first attempts fail. Why would it not be possible with this method, together with the inoculation of experiment animals, to make an early diagnosis in cases of suspected tetanus traumaticus, if anything is to be gained thereby?

To obtain pure cultures, then, of the tetanus bacillus from cases of traumatic tetanus, or experiment animals, the following method is recommended:

1. Inoculate alkaline bouillon with the pus from the wound, or, pus being absent, small bits of tissue from the inside of the wound, or in experiment animals inoculated with pure cultures, bits of tissue from the region of the point of inoculation are used.

2. Place tubes in an atmosphere of hydrogen and in the breeding-oven for forty-eight hours.

3. Examine microscopically, and if tetanus bacilli are present—

4. Heat from three-quarters of an hour to an hour in water-bath previously heated to 80° C.

5. From heated tubes inoculate fresh bouillon, and place in thermostat under hydrogen for forty-eight hours.

6. Test purity by microscopic examination and cultures in gelatin, agar, etc.

7. Test virulence on mice, white or gray.

REVIEWS.

A Practical Treatise on Diseases of the Skin, for the Use of Students and Practitioners. By James Nevins Hyde, A.M., M.D., Professor of Skin and Venereal Diseases in the Rush Medical College, etc. Third edition, thoroughly revised and enlarged. 8vo., pp. xx., 802. Philadelphia: Lea Brothers & Co., 1893.

The rapidity with which new books and new editions of standard works on dermatology have appeared during the last decade is significant of the strong and steadily increasing interest in this department of medicine. Twenty-five years ago when the only books accessible to the average student were the involved and intricate tomes of Erasmus Wilson, or one or two translations from the French with their metaphysical abstractions of herpetism and the dartrous diathesis, it was no wonder that the study of cutaneous diseases possessed few attractions. Even the excellent text-book of Tilbury Fox, that appeared at about that time, was better adapted to the specialist than to the student.

It was not, however, until the publication of good translations from the Vienna school, and the return to this country of many young and enthusiastic disciples of Hebra, that the study of skin diseases took on the scientific precision that has since characterized it.

In due course of time there came into the hands of the profession a number of excellent treatises written in America, such as the unusually able works of Duhring, Piffard, G. H. Fox, Robinson, and others.

As might be expected, these works showed the influence of European teaching—but by no means altogether German in character—still they possessed a degree of originality and freedom from that swearing in the words of the masters that is the bane of all independent research.

That we have not a distinctly American school of dermatology is due to the essentially eclectic attitude of the American mind. If, as Matthew Arnold said, we lack a perspective to make us interesting, we are also free from the prejudices of one, and perhaps while losing in interest we gain in intellectual freedom.

Even the Europeans are beginning to appreciate the real advantages of this attitude: the Germans admire Hebra and admit his rare distinction as a great teacher, but they no longer follow him blindly; the French have at last escaped from their doctrinaires; and in England a new spirit of solid and conscientious work is the demand of the hour in dermatology.

The work before us has suggested, and in many ways illustrates, what has just been written. Dr. Hyde, if we are not misinformed, was one of the small band of men who took up the practice of dermatology twenty-three or four years ago, and by hard work in the clinics, in the lecture-room, and in the columns of the medical press, taught the profession to understand its importance as a special branch of medicine.

The first edition of this text-book, dedicated then as now to Professor Kaposi, showed very plainly the influence of Vienna, and although well received at the time, for it was a meritorious attempt, it lacked the personal element, the sort of genial dogmatism that comes from long experience and familiarity with the subject. The second edition was a decided advance in every direction. The edition just issued from the press, the third, exhibits the author in the maturity of his experience both as a teacher and student, and fully represents the science and art of dermatology as it exists to-day.

The general scope and especial features of this work have already received sufficient notice in this Journal, and it only remains for us to point out the additions that have been made to this edition.

An examination of the text shows that the author's statement in regard to emendations and improvements is perfectly correct. Five new plates and thirty-two new woodcuts have been introduced. They are all good, and the process plates are more satisfactory than is usual in such illustrations.

Thirty-five diseases hitherto undescribed by the author find a place in this edition, and receive such treatment as their relative importance would seem to justify. Among the more important of these may be mentioned pityriasis rubra pilaris, keratosis follicularis, the psorospermic nature of which is denied, xanthoma diabeticorum, pemphigus vegetans, actinomycosis, and leucokeratosis buccalis.

A number of minor affections and various tropical disorders also receive brief but adequate notice.

Perhaps the most valuable chapters in the book are those relating to Tuberculosis of the Skin, in which process are included lupus vulgaris, with its manifold clinical expressions, the scrofulodermata and the various types of skin lesion in which tubercle bacilli have been demonstrated.

According to Dr. Hyde, some of the disorders of the scalp called "epilating," "cicatricial," "follicular," and other unnamed forms of alopecia, are in all probability tubercular in character.

We are quite in agreement with him in believing that a large number of so-called acneiform and other ulcerative and cicatricial disorders of the skin will yet find their pathological explanation in the tubercle bacillus.

The section devoted to Eczema is well handled, although in our judgment the therapeutic indications lack somewhat in that degree of precision necessary to the student and young physician. Ichthyol is not so highly lauded as would seem to be the fashion at the present time. The author very properly protests against the multiplication of unmeaning and fantastic terms in cutaneous nomenclature, and says that such words as "eczema seborrhoicum," "lichen psoriasis," and the like, should be eschewed.

Without taking up page after page and chapter after chapter, it would be impossible to convey an adequate impression of the immense amount of labor and research that has been expended upon this treatise; and, indeed, such a course would be, after all, tantamount to a complete exposition of modern dermatology; for such in effect is the result presented to the inquiring student. It would be an ungracious task, where so much is praiseworthy, to point out the comparatively few sins of omission and commission that may be noted here and there. Taken all in

all, Dr. Hyde's book may be heartily commended to the student and practitioner alike as one of the best exponents of the subject now before the profession. As is usual with the eminent house whose imprint is on the title-page, the typographical execution is all that could be desired.

W. A. H.

PYOGENIC INFECTIVE DISEASES OF THE BRAIN AND SPINAL CORD: MENINGITIS; ABSCESS OF BRAIN; INFECTIVE SINUS THROMBOSIS. By WILLIAM MACEWEN, M.D., Glasgow. New York: Macmillan & Co., 1893.

IT would be difficult to find a better example of the progress which surgery has made during the past decade than in the contrast between the sombre views which in 1883 Professor Macewen says he was inclined to take as to the prospects of recovery from operations for cerebral abscess and his present statement that he "now regards an uncomplicated cerebral abscess, early recognized, accurately localized, and promptly operated on, as one of the most satisfactory of all intra-cranial lesions, the patient being at once relieved from a perilous condition, and usually restored to sound health." While the outlook for cure of the more serious lesions of infective meningitis and sinus thrombosis is not yet nearly so good, he sees reason to hope that as our knowledge of them increases, the results of surgical treatment will correspondingly improve.

Like most of the author's published work, the volume is based largely on personal experience. An introductory chapter on the temporal bone and the cerebral sinuses and membranes sets forth their surgical anatomy with great detail and with equal clearness as to their relation to the course and symptoms of pyogenic diseases. Attention is called to the elaborate arrangement which exists to prevent the intra-cranial venous system from being subjected to the aspiratory action of the chest movements in inspiration. Every surgeon has seen, during operations on the neck, when the carotid sheath has been opened, the remarkable variation in size which occurs in the internal jugular vein, collapsed and flattened during inspiration, turgid and tense when expiratory movements are made. If the venous sinuses were affected by deep breathing to the same extent as the internal jugular it is evident that a condition approaching unconsciousness would often result from the momentary cerebral anæmia. As a matter of fact, rapid, forcible breathing does produce this condition to an extent which has enabled minor surgical procedures, like the opening of an abscess, to be done without pain to the patient. The explanation which is given of the mechanism by which such anæmia is prevented from occurring ordinarily is an excellent example of the thoroughness and fulness with which the anatomico-physiological side of the subject is treated.

In the chapter on Pathology, abscess and infective meningitis are considered together, as whether the one or the other results from a given extra-cranial source of infection depends chiefly, or entirely, upon the anatomical relations of the structures and the intensity of the inflammation caused by the micro-organism. The various infective intra-cranial lesions may, therefore, be classified as follows: 1. Inflammatory process slow, mild, distinctly localized, and involving a portion of the inner

table—external pachymeningitis or extra-dural abscess. 2. If this condition persists, adhesions of the arachnoid and pia take place and shut off the general subdural cavity just as general pleurisy is prevented from following abscess of the lung by adhesions of the visceral and parietal pleura, and as the abscess of appendicitis is walled off from the cavity of the peritoneum. 3. Further persistence may be followed by softening. If the pia remains intact a subdural abscess forms; should it give way cerebral ulceration or abscess follows; should the wall of the abscess break down lepto-meningitis results. 4. The latter condition occurs if the micro-organism penetrates rapidly to the inner layer of the dura before much exudate has formed.

Other sources of infection and various forms of disease are considered: punctured wounds of the cranium; punctured fractures; infective injury to the skull without fracture; pathogenic affections of the face and scalp, etc. But the author's experience shows, as does that of the profession, that "It is in the tympanum and antrum that the majority of the pathogenic processes are generated which afterward spread intracranially and affect the brain and its membranes." And it is also true that it is especially the *chronic* affections of the middle ear that lead to this result.

The various terminations of cerebral abscess are exhaustively considered—absorption, encapsulation, spontaneous external evacuation, leakage into the subdural space or into the ventricles, etc. It is noted that Gruber's interesting case shows that an abscess can form as a result of otitis media and remain *in situ* while the ear disease disappears. This is, however, rightly said to be of great rarity.

The symptoms of abscess are divided into those characteristic of three stages: 1. Initiatory; 2. Full development of abscess; 3. Various terminations. The *first* includes otorrhœa, ear pain, vomiting, rigors, slight fever, diminution of discharge of pus from the ear; duration from twelve to seventy-two hours, or even to a week.

The *second* embraces lessening of pain, tenderness on mastoid percussion, slow cerebration, want of sustained attention, mental obscuration, gradual diminution of ability to apply strength, temperature normal or subnormal, pulse slow and full, respirations slow, constipation, anorexia. Vomiting, rigors, and convulsions are rare. Paralysis is not infrequent. Optic neuritis is common during the later stages. Localizing symptoms are rare because in the majority of instances the abscess is outside the motor area.

The *third*, or terminal stage, may be marked by stupor and coma; or, if acute lepto-meningitis follows, by "vomiting, restlessness, temporary squinting, flushing and erratic rigidity of the limbs, clonic spasms, trepidation, and prostation, the pulse meanwhile becoming quick, the breathing hurried, and the temperature high."

As to prognosis, the author states that while the great majority of cases not dealt with surgically end in death within a short period, generally a few weeks, on the other hand there is no cerebral affection more amenable to surgical treatment, and none which offers better results. An uncomplicated cerebral abscess whose position is clearly localized, if surgical measures are adopted for its relief at a sufficiently early period, is one of the most hopeful of all cerebral affections.

The prophylactic treatment of all the pyogenic diseases (the remainder of which space will not permit us to discuss) is obvious. As abscess in

the brain, infective thrombosis of the intra-cranial sinuses, and lepto-meningitis originate in primary infective foci; the first step in prophylaxis is to prevent the occurrence of such foci, the second to eradicate them when present. The methods of doing this are fully and clearly described.

The operative treatment of these affections is also given in detail and with the author's characteristic attention to the minutiæ, which here, if ever, are essential to surgical success.

The concluding chapter, on "Results," gives, among other statistics, the records of 94 cases of infective intra-cranial lesions, with 74 operations, 63 deaths, and 31 recoveries. It is interesting to note that of the 25 abscesses of the brain included in that table, 19 were operated on and 18 recovered.

Everything that Professor Macewen writes is certain to be of interest to the profession, and his habit of waiting for time and experience to elucidate his theories and demonstrate the soundness of his methods has rendered this last contribution to brain surgery as noteworthy as the brilliant and original articles in the same direction which he has previously published.

It is rare to find a book written on such a high scientific plane which is at the same time so practical and helpful, and it is a pleasure to commend it not only to surgeons but to the profession at large.

J. W. W.

A Practical Treatise on Materia Medica and Therapeutics. By Roberts Bartholow, M.A., M.D., LL.D., Professor of Materia Medica, General Therapeutics, and Hygiene in the Jefferson Medical College of Philadelphia; Fellow of the College of Physicians, etc. Eighth edition, revised and enlarged. Pp. xxvii., 820. New York: D. Appleton & Co., 1893.

When a treatise has reached its eighth edition, it might seem that criticism is superfluous, that the work has already demonstrated that it found a place and has filled it. The revision of the United States Pharmacopœia brings with its appearance the necessity of re-writing the Materia Medica; the ever-advancing science of Therapeutics demands that new theories and new remedies shall have a place, and that the obsolete shall be expunged. As we read the pages so familiar to us since when a student we read an earlier edition, we note the many additions, but we recognize much that might have been omitted. Some drugs which are old, but yet not in general use, as trichlorphenol, thallin, and trimethylamine; others more recent, as chloralose, formanilide, need more extensive clinical investigation before they should have a place in a text-book. Of the newer remedies we are pleased to find that the author has not been made unduly enthusiastic by the current literature concerning the organic extracts, and we commend his fairness of statement. Hypodermatoclysis also receives just appreciation. As in the earlier editions the author very properly adheres to the use of *hypodermatic* in place of *hypodermic*, although we notice *albumen*, p. 177, for *albumin*. We note several misprints of proper names, as Histon Fagge, p. 25; Stockler, p. 394; C. Vaughan, p. 59; Heuchard, p. 250;

while the same author appears as Mosetig, p. 259, and Von Mosetig-Moorhof, p. 261. Nor are we inclined to believe that an issue of a medical journal of 1883 is a recent one, p. 30. On p. 122 we find practically the same statement as to cod-liver oil with ether repeated. We do not note many important omissions, yet, p. 13, wafers are sometimes made of starch, and bougie is more frequently used than suppository when a drug is intended to be inserted into the urethra or nasal fossæ, and gelatin is an eligible vehicle; p. 278, mercury can be administered hypodermatically, as Lang's *oleum cinereum;* p. 155, several recent bismuth preparations, of which the subgallate is an example, are in extensive use; p. 264, aristol, which is probably quite as valuable as iodol; p. 293, copper arsenite, and, p. 360, guaiacol have attracted considerable attention; p. 385, lysol in many instances can advantageously replace creolin; p. 396, methacetin may supplant phenacetin; p. 696, naregamia appears to be important as a substitute for the ordinary ipecacuanha, and camphoric acid has been strongly recommended in the sweating of tuberculosis; p. 42, matzoon is considerably more popular than kefyr. We believe that Smith's experiments justify the belief that it is the acid of the iron preparation which injures the teeth, p. 141; and that the alkalinity of the hypophosphites is the cause of digestive disturbance, which may be corrected by dilute phosphoric acid, p. 135; that sarsaparilla, when administered with the corrosive mercuric chloride, may give rise to poisonous symptoms from its absorption from the ulcerations caused by the latter, p. 335; that local applications of salicylic acid in rheumatism should be considered, p. 376; that bromoform taken internally has given rise to dangerous symptoms, p. 619; that magnesium sulphate as a cathartic can be effectual when administered hypodermatically, p. 707. In the generally enthusiastic view of the efficacy of drugs we are surprised to find considerable skepticism as to the value of the hypophosphites, p. 135; hydrogen dioxide, p. 349; and if the large experience of Sommerbrodt and of Von Brunn and the patient work of Robinson are of any value, creosote, p. 360, should have received more attention. We believe that codeine, p. 604, has a much larger field of usefulness, and that in many instances it can advantageously replace morphine. The index hardly gives an idea of the contents of the book, nor is it an easy method of looking up a subject. There are a few instances of error, as, asaprol is found on p. 394, not on p. 732. The clinical index is rather more than a series of therapeutical suggestions, but it should be used only with the careful study of the references there contained.

We have found great satisfaction in reading this last edition. That a student should be graduated possessing the firm confidence of the author that certain remedies are potent in combating morbid conditions would lead only to bitter disappointment. That it is rather a book for suggestion to the practising physician that others have found these drugs useful as remedies, and that his previous experience shall aid him in weighing the various statements is, we believe, true. For a student the sound basis of therapeutical theory is physiological experiment; if he cannot master this he is not likely to become a brilliant therapeutist. For an inexperienced graduate to attempt to apply the teaching of a treatise on therapeutics based upon empiricism, when he does not possess the wide information, the careful reasoning, and the general skill which have made the fame of the author, is to invite failure. That this is

one of the best works written from the standpoint of clinical observation we are firmly convinced, and we write remembering the many years during which this book has been constantly in use. R. W. W.

HOLDEN'S MANUAL OF THE DISSECTION OF THE HUMAN BODY. Edited by A. HEWSON, A.M., M.D. 12mo., pp. 803. Philadelphia: P. Blakiston, Son & Co., 1894.

THE last, the sixth, edition of *Holden's Anatomy*, which has recently appeared, takes high rank among dissecting manuals. It is peculiarly well fitted for the dissecting-room and for the student's study of regional anatomy. The illustrations are numerous, accurate, and well chosen; the text is clear and sufficiently full. The text might be criticised for the retention, here and there, of bits of nomenclature which should be regarded as obsolete—such as the terms Heys' and Burns' ligaments, the horny band of Tarinus, testes muliebres, etc.

The text and illustrations are well arranged. The book fills the place for which it is built as well, if not better, than any other text-book of its class, and is to be regarded as standard. Instructors of anatomy should more generally insist upon the employment of such a dissector by their students.

In the study of anatomy the study of the regions as usually carried out in the dissecting-room is the method productive of the best and most practical results. It appears to the student more difficult than the study of systematic anatomy, and it is more difficult for the beginner.

The study of regional anatomy becomes much easier and much more profitable to the student who has already mastered the "systems," osteology, myology, etc. In our American schools where anatomy is studied for two years, the manner of dividing the subject differs greatly. In some schools the entire subject is covered in each year. In others osteology, arthrology, and myology are studied the first year, the remainder of the subject the second. Still other divisions are adopted. The most satisfactory division seems to be: First year—Systematic anatomy, the study of the systems, bones, joints, muscles, vessels, nerves. Second year—Regional anatomy, with special emphasis on brain and cord, thoracic and abdominal viscera, genito-urinary organs, and organs of sense. In the second year the practical and clinical points can best be brought to the student's attention.

In addition to didactic lectures and dissecting-room work the anatomical class should be divided into small sections of not more than forty men, each section reciting to an instructor lessons which have been assigned in a text-book. This method makes it necessary for each student to possess two text-books on anatomy—one a systematic text-book, such as Gray, Quain, or Morris, to be used as a text-book for first-year work and for reference; the other a manual of dissection, a regional anatomy to be used in the dissecting-room and during the greater part of the second year.

Holden's Anatomy and works of its class are not to be recommended to displace in the student's library systematic text-books on anatomy, but are to be strongly recommended for the dissecting-room and as a text-book for such second-year work as above outlined. A. D. B.

PROGRESS

OF

MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

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The Successful Management of Inebriety without Secrecy in Therapeutics.

Dr. C. H. Hughes believes that inebriety is a disease which can be successfully treated; the unfortunate victim of alcohol is to be cured and then reformed, through the seeking of medical relief. The trouble in the past has been the failure to seek, by suitable changes of environment and proper medical treatment, that renovation and rebuilding of the damaged organism which makes resistance to alcoholic enslavement a possibility, in the organism of the average habitual or periodic inebriate. The first essential to the cure of inebriety is the substitution of a less harmful support than alcohol to the shattered brain, nerves, and damaged vital organs: in order of preference, morphine, strychnine, quinine, cinchona, valerian, coca, ammonium bromide. The second is water, plenty of it, or its equivalent, milk. The tissues, the blood, the emunctories and the skin must have it. The third is rest, a new and proper environment; and subsidiary are the chemical restraints therapeutics may place on over-acting nerve cells: chloral, sulphonal, bromides, vegetable narcotics, valerianates, opiates, cephalic galvanization, soothing music, the bath. The fourth is the removal of the débris of the last and previous drunks; here saline laxative waters without stint is the remedy *par excellence*. The effervescent saline which clears out the alimentary canal tranquillizes the brain at the same time, although mercurials are not amiss. The fifth is the reconstruction of the undoubtedly damaged cerebro-spinal centre, and the several affected organs of vegetative life. This begins with rest and sleep and food, the phosphates, the hypophosphites, the hæmatics, milk, beef-tea, capsicum. Sixth is destruction of the drink-craving, which must be done upon physiological principles; train the victim's own inhibitions, first by suggestion, secondly by moderate indulgence properly treated. Spiritus frumenti, ℥ij, cum vino antimonio, ʒj, can be repeated *ad libitum*, or

apomorphine with aurum bichloride for psychical effect. After confidence in his strength has returned to the patient, he must be warned to never again have confidence in his power of resistance with alcohol in his blood. The cure of the drink habit is not always perpetual; it is not everlasting without the aid of the patient himself.—*The Alienist and Neurologist*, January, 1894.

The Denutritive Action of Duboisine.

Dr E. Marandon de Montyel has found that the marvellous sedative effects which follow the administration of this remedy are almost always associated with a very disturbing failure of nutrition. Of twenty-five cases, eighteen lost weight, even in the absence of all gastric symptoms, a simple diminution of appetite not being excluded. This failure of nutrition seems to be entirely independent of any influence which it may exert upon the alimentary canal. The four inconveniences of this drug are: 1, an acquired tolerance; 2, gastro-intestinal disturbance; 3, cardiac enfeeblement; 4, denutrition. By interrupting the treatment the first difficulty is overcome. By injecting the remedy immediately after meals, the second is avoided. In persons suffering from cardiac disease duboisine should be proscribed, and this constitutes the only actual contra-indication, for the denutritive influence can be considerably reduced by attention to diet, use of tonics, especially if the treatment is not of long duration.—*Bulletin général de Thérapeutique*, 1894, 8e liv., p. 145.

Hypodermatic Injections of Blood.

Dr. Bloch reports a case of a single patient under whose skin he injected at two different times three drachms of blood which he obtained from a donor, the result of eight bites made by three leeches upon the arm, the blood being received in a basin previously sterilized, and injected pure. The first injection gave rise to a vigorous reaction, the second was, however, without local manifestation. Similar injections in tuberculous cases gave excellent results. The following are the conclusions: 1, These injections can be employed in cardiac adynamia when other medicaments fail, and then their dynamic action is certain; 2, they are harmless for donor and recipient, necessitating only the abstraction of a small quantity of blood, and this can be repeated; 3, they are applicable to pulmonary tuberculosis, and one can, as occasion offers, inject the blood of a near relative sharing in the same tuberculous heredity and refractory to the disease. Or, again, injection can be made of blood taken from a local or attenuated tuberculosis.—*Journal des Practiciens*, 1894, No. 17, p. 200.

The Preparation of Concentrated Testicular Liquid.

M. A. D'Arsonval now prepares this liquid so that it is not only aseptic, but it possesses such antiseptic properties that if it should be contaminated by pathogenic germs, these germs will be rapidly killed or rendered powerless. He figures a macerator and a sterilizer. The testicles are macerated in the apparatus in glycerin for twenty-four hours, and then filtered in the second apparatus through Chardin paper, which has been sterilized in carbon dioxide

under a pressure of fifty atmospheres for three or four hours. It is not certain that the combined action of concentrated glycerin and carbon dioxide under a pressure of fifty atmospheres will result in perfect sterilization, therefore the use of extracts heavily charged with glycerin is persisted in. The new extracts are more active, as has been shown by experiment. The liquid should not be injected pure, but diluted with two or three times its volume of 1 per cent. salt solution, or carbolized water, one per mille. This solution should be made very slowly, so that an intimate mixture may be made.—*Archives de Physiologie*, 1894, No. 1, p. 172.

Antirabic Serum.

Drs. G. Tizzoni and E. Centanni have endeavored to produce a serum which should have a higher immunizing strength and applicable to man. In order to accomplish this, and have the material in a permanent condition, the immunizing strength should be at least 1:300,000, and the dose of the powder for a man of average weight would be not quite three and one-half grains dissolved in five times its weight of water. The results should be even more favorable in man, because he is less susceptible to rabies. Experiments with sheep and dogs show that the serum reached its highest point of antirabic activity at about the twenty-fifth day after vaccination, when it was of the strength of 1:25,000 to 50,000. In comparison with the Pasteur vaccine, the present serum offers the following advantages: activity in every period of incubation to the first appearance of the first symptoms of rabies; the action commences immediately; entire absence of virulence or unpleasant effects; rapid treatment with one or a few injections of a small amount of material; complete solubility, and therefore rapid absorption; its longer preservation in a dry state, so that it can be readily used by the physician at the home of the patient. It is hoped that the use of this serum will soon be commenced for man, and it will then be put to the severest test, the cure, in man, of rabies which has already developed.—*Berliner klinische Wochenschrift*, 1894, No. 8, S. 189.

Sporadic Cretinism treated by Thyroid Feeding.

Dr. Byrom Bramwell, regarding sporadic cretinism as an infantile form of myxœdema, has made use of thyroid extract. The commencing dose was five minims, which two days later was increased to seven. The latter dose produced vomiting, an excited condition, grunting, and laughing, with the rise of temperature about one degree. The next day the dose was reduced to five, and five days later an additional evening dose of three minims was added. In consequence of this dose the patient became excited, could not sleep, and was in a hysterical condition. This excitement was followed by considerable depression. Three days later the dose was diminished to the original one; further increase always resulting in excitement, the original dose was regarded as the maximum one which could be borne satisfactorily. At the end of the first week the treatment had produced a marked effect, the swelling of the tongue, lips, and body generally was lessened, the patient swallowed better, she looked bright, and seemed to fix and follow an object with the eyes in a way which she did not before do; the mouth was frequently

closed; the skin was not nearly so rough and harsh. Nine days later the patient looked much brighter and was thinner; the firm myxœdematous infiltration of the tissues seemed to have entirely disappeared; the skin was much less harsh and dry, and was peeling on the legs and feet; her mental condition was much more lively; the constipation had almost entirely disappeared. About a month after the commencement of the treatment she passed through an attack of influenza. After six months' treatment great improvement was remarked; a gain of over six inches in height; cutting of four new teeth; better able to support herself upon her legs. The general result of the treatment has been that the œdematous infiltration of the tissues rapidly subsided, and in the course of a few weeks disappeared; the patient is now lively, and a considerable amount of improvement has taken place.—*British Medical Journal*, 1894, No. 1723, p. 6.

The Treatment of Diabetes.

Dr. Ch. Eloy, following Worms, divides the cases into three groups: 1, those easily reducible; 2, those irreducible; and, 3, those which are transitory or periodic. The moral treatment is important; quiet of mind; travelling. So far as concerns the diet: if a meat diet with simply a reduction of the amount of bread, with the proscribing of starches and sugars, remove the sugar from the urine within forty-eight hours, this will be sufficient. If not, then an exclusively meat diet becomes necessary. In the reducible form a certain tolerance for starches and sugars is acquired, which can be found on experimentation, and this amount can be allowed if there is no polyuria. In the irreducible form a more strict diet is necessary. In the intermittent form there must be an energetic intervention, daily analyses, and a prompt reduction of sugar; later the diet may be chosen according to the power of the organism for burning up the excess of sugar. With the diet the use of the alkalies (Vichy), of sulphate of quinine in daily dose from three to five grains, either alone or with arsenic, cold lotions about the head, repeated morning and night, and saline purgatives, promise the best results.—*Journal des Practiciens*, 1894, No. 8, p. 88.

The Treatment of Syphilis.

Dr. Eduard Lang, although believing that with few exceptions mercury and iodine are unsurpassed remedies for this disease, yet holds that the time, duration and method of application are widely dissimilar. In many cases the curative effect of sarsaparilla is unmistakable, particularly the concentrated decoction being preferred, preliminary to mercury or the iodides. Whether the soda or potash iodide is used is unimportant, the dose in obstinate cases may be one hundred and fifty grains, but usually thirty grains per day is sufficient. If necessary it can be administered *per rectum*, as Köbner has recommended, in 1 to 2 per cent. solution in water, milk, or in a nutritive enema. With codeine a grain to a drachm each of the potash salt, and distilled water, it can be used hypodermatically without great pain. With mercury, cancerous, nephritic, tuberculous, and malarious processes do not react well, and there is even danger of administering it in the hemorrhagic

diathesis. Even unexpectedly, ordinary doses may give rise to serious, even fatal poisoning. The administration of mercury in pill form presents many sources of error in dosage, some of which are obviated in his *grauen Pillen*, which are composed of proto-iodide of mercury, 3; extract of opium, 1; lanolin, 3; and sugar of milk 9 parts, the dose being regulated. In this pill the lanolin melts within the body and the sugar of milk dissolves, so that the mercury becoming free is readily absorbed. Calomel, or the corrosive chloride, in proper dose, may be substituted for the proto-iodide. In general the method of administration by pills is not to be preferred, nor by inunction have we any opportunity of knowing how much is absorbed. The same disadvantage is apparent in the injection of unstable compounds. The site selected for the injection of his *oleum cinereum* (see AMERICAN JOURNAL OF THE MEDICAL SCIENCES, vol. ciii., p. 576) is at the junction of the neck and back about two inches from the median line, on either side, which will permit of five or possibly six injections each. If more than one series is necessary they can be made in a vertical line about two inches exterior to the first. It is claimed that this method is practically free from inconvenience, and gives a sure and rapid cure.—*Centralblatt für die gesammte Therapie*, 1894, Heft 1, S. 1.

THE CLINICAL EFFECTS OF HYOSCINE HYDROBROMATE.

MR. GORDON SHARP has found that although this drug is an isomer of atropine and hyoscyamine, its clinical effects resembled in every way those of atropine. Pharmacologically the drug appeared to resemble atropine (frogs), and chemically it differs from it in that it only slowly reduces mercuric chloride while the former reduces it rapidly. He reports three cases. In the first was observed dilated pupils, rapid pulse and accelerated respiration, dryness of the throat, flushed face, pleasing fancies—if one might so believe from the smile which every few minutes passed over his face. The points of most interest were the partial paralysis of the muscles of speech and deglutition and of the eyelid. In the second case the dilatation of the pupils, flushing of the face, acceleration of pulse and respiration, dryness of the throat, and incoherent mumbling were noticed. Consciousness was lost, and finally death occurred, probably hastened by the great stimulation of the circulation and of the respiratory centre. In the third case, when one-seventy-fifth of a grain was administered with the object of relieving headaches and sleeplessness, the patient became "funny," the throat was dry, she had severe jerkings of the limbs, and became so delirious that she alarmed her attendants and even the physician. He concludes that the action of hyoscine differs little in its action from atropine, and until more is known of its chemistry, pharmacology, and clinical effects, it can hardly be recommended as a safe hypnotic.—*The Practitioner*, 1894, No. 307, p. 22.

THE DOSE OF SANTONIN.

DR. D. H. BERGEY has often made use of ten-grain doses of this drug for its emmenagogue effects, and has never learned of the slightest discomforts from such a dose. He rarely administers more than a single dose, and if more is required waits twenty-four hours before repeating it. He does not

believe that it is possible to produce a miscarriage or an abortion by it, but it is a safe remedy to use for suppressed menstruation.—*The American Therapist*, 1894, No. 7, p. 215.

Hydrogen Dioxide (Peroxide of Hydrogen).

Dr. Edward R. Squibb, recognizing the erroneous, misleading, and confusing character of the literature, presents a very thorough and scholarly paper upon the manufacture, testing, and preservation of this product. He recommends the use of barium dioxide, BaO_2 (commonly known as peroxide of barium, and which as imported contains from 78 to 93 per cent. of barium dioxide). This product is assayed to determine its exact percentage; it is then sifted into water constantly stirred, and is then allowed to stand until sufficient hydration is obtained, when the magma is diluted and strained. It is then treated with phosphoric acid, of which the so-called syrupy phosphoric acid contains 83 to 91 per cent., being continuously stirred, and the solution of hydrogen dioxide filtered off. To remove the small proportion of acid barium phosphate, sulphuric acid is gradually added during constant stirring. The best preservative against decomposition has been found to be a mixture of boric acid and glycerin in about the proportion of 62 to 92, boiled down to 130 parts, and added in the proportion of 1 per cent. An important collateral advantage of this agent is that it is not objectionable, as its influence and effects are in the same direction as that of the solution. Of the different acids used by manufacturers to decompose the barium dioxide, hydrofluoric acid is a hurtful irritant; traces of sulphuric acid are are also objectionable.—*The Ephemeris*, 1894, No. 2, p. 1545.

The Treatment of Chlorosis.

Dr. P. Le Gendre believes that almost all chlorotics are also dyspeptics, from a simple gastric atony to dilatation accompanied with deficiency of hydrochloric acid. Some suffer from an intermittent hyperacidity, especially when the stomach is empty, such being exposed to dangers of gastric ulcer. For the dyspeptics he orders: 1. Before the meals, simple bitters, as quassia, or the excito-motors of muscles, as strychnine. 2. At the end, or half an hour after the meal, the hydrochloric acid lemonade (3 or 4 to 1000 parts), a wine to a full glass in quantity, the latter to be taken through a glass tube. If gastric dilatation is present, naphthol, bismuth salicylate, or chloroform water, three or four hours after meals, is useful. If there is hyperacidity, antacids, as soda bicarbonate, prepared chalk, or calcined magnesia may be administered, one and a half or two hours after meals. Milk, with alkalies, or beer is better suited to the dyspeptic chlorotics than stronger alcohol or wines. Inhalations of oxygen, baths of compressed air, are frequently of great service. In administering iron the choice must be made of a preparation which is easily assimilated, the proportions must be varied, and the remedy should be taken in the midst of the meal to avoid contact with the gastric mucous membrane. The organic salts, oxalate, potassio-tartrate, citrate, and lactate, or reduced iron, have given good results; so also the ferruginous mineral waters, as Forges, Spa, can be used. Constipation must be obviated by vegetable laxatives, as cascara, rhubarb, podophyllin, and intestinal excito-

motors, and by irrigation of the large intestine. Hydrotherapy is an excellent auxiliary, from cold application and wet sheets to the douche. It should, however, be used with caution with very weak or excitable chlorotics. Salt and sulphur baths also render good service.—*Revue de Thérapeutique Médico-chirurgicale*, 1894, No. 4, p. 92.

The Treatment of Pernicious Anæmia by Arsenic.

Dr. J. S. Risien Russell reports a single case in which the treatment was begun with four minims of liquor arsenicalis and fifteen grains of the ammonio-citrate of iron, three times daily; the dose of the latter was not increased. The former was increased gradually until, within five weeks, the patient was taking twelve minims three times a day. About three months after this treatment was begun, irritation of the eyes became troublesome, and it was discontinued. The iron, however, was given in twenty-grain doses thrice daily. Two weeks later, four minims of the liquor arsenicalis in combination with the original dose of iron was given, the arsenic being subsequently increased to six minims, and the treatment was discontinued altogether about two months later. The shortness of breath, œdema, and appetite improved, and in general his urgent symptoms were relieved, and one year later he looked and felt perfectly well. Although iron was used in addition, it is believed that arsenic alone was responsible for the cure, because during the time when the arsenic was omitted, and he was taking the iron alone, he relapsed.—*British Medical Journal*, 1894, No. 1728, p. 298.

The Treatment of Chronic Rheumatism.

Dr. Dujardin-Beaumetz divides chronic rheumatism into three groups: 1, rheumatismus deformans (Charcot); 2, chronic, succeeding an acute rheumatism; 3, the multiple manifestations in chronic course of a rheumatic. The first group must be treated for a disturbance of nutrition, and arsenic and the iodides give the best results. Fowler's solution, sodium arsenate, arsenous acid are useful, but arsenical baths—because it has been proven that an intact skin does not absorb medicinal solutions—are likely to be therapeutic illusions. In the iodine treatment, the iodine itself is not to be preferred to the iodides, because, even if administered in wine, it irritates the stomach. Of the iodides, an average daily dose of fifteen grains is sufficient; as a potassium iodide, or as sodium iodide with the sodium bromide and chloride, or in alteration with gold and sodium chloride. For the painful crises, phenacetine gives the best results. Paracetphenetidine, in seven-grain doses, is a powerful analgesic. The diet is the opposite to that of the gouty: meats, green vegetables, generous wines and milk. The external treatment consists in electricity and balneotherapy. The chronic rheumatisms of the second class are relieved by the salicylates, and they as well have a preventive action. Fifteen to thirty grains per day, or, in some cases, asaprol, and more rarely phenacetine, are required. But the essential cure of this rheumatism is external treatment, massage, electricity, and balneotherapy. The massage, methodically employed, and with care, during the period of quiescence, benefits the functional impairment of the joints, and as well the accompanying muscular atrophy. The muscular atrophy is benefited by

electricity, by continued or slowly interrupted currents. The baths at Aix, Bourbonne, Plombières, and Dax, particularly the mud-baths at the last station, give excellent results. For diet, a mixed one, in which vegetables form a large part is indicated. It is important that the different emunctories shall act properly, and laxatives and diuretic liquids should be employed, white wine or milk. In the last form it is the diathetic condition which must be opposed; here the thermal waters and regulated diet are important. Muscular pain and neuralgias of rheumatic origin are relieved by antipyrin, and especially phenacetine, which should be placed by the side of sodium salicylate and asaprol. In this class also the bowels should be kept open and the kidneys active, and in the latter case the action of antipyrine in diminishing the urinary secretion may be a disadvantage. To assist the skin in performing its functions vapor baths, Russian baths, warm or Scotch douche, even the cold douche, are excellent methods. As for the thermal stations, especially are to be considered Dax, and afterward Plombières, Aix-les-Bains, Bourbonne-les-Bains, Bourbon-Lancy, the last particularly for the visceral manifestations, the myocardites. The diet should not include any substance which can contain toxic ptomaïnes. Game, fish, shell-fish, mushrooms, old cheese, should be guarded against, while a vegetable diet, milk, and fruits are useful.—*Bulletin général de Thérapeutique*, 1894, 6th liv., p. 97.

MEDICINE.

UNDER THE CHARGE OF

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A Large Cerebral Tumor without Headache and Eye-ground Changes.

Pel (*Berliner klinische Wochenschrift*, 1894, No. 5, p. 106) has reported the case of a woman, forty-six years of age, who came under observation on account of weakness of the right arm, difficulty in walking, nervousness, and impairment of memory. These symptoms had developed insidiously during the preceding year, without recognizable exciting influence. There had been no traumatism, and there was no history of syphilis or of alcoholism. The first symptom had been a feeling of numbness at the tips of the fingers of the right hand, to which motor weakness was soon added. The loss of power gradually progressed, and in a short time the forearm, and later the arm also, became paretic. At the end of a year the right leg began to display evidences

of weakness, while at the same time it was noted that the memory was failing and cerebration was difficult. The woman became markedly emotional, and was annoyed by her condition. At about this time she was suddenly seized with a convulsive attack, in which consciousness was not entirely lost, and the right arm and leg, and the right side of the face, were jerked, and after which, speech was difficult and labored, with an inability always to recall the proper word, with some stuttering and the repetition of the same word. There had at no time been headache, nausea, vertigo, or vomiting. Vision and hearing were undisturbed. Percussion gave rise to no more pain upon one side of the head than upon the other. The appetite was impaired, the bowels regular. The urine was normal in amount and constitution. The functions of bladder and rectum were not deranged. Intelligence was obscured, the appearance dull. The paralyzed members were cyanotic and swollen. The pulse was small, regular, soft, alike on both sides, and neither accelerated nor retarded; the vessels were a little rigid. Respiration was normal in frequency and rhythm. Both eyes could be closed with equal firmness and opened equally wide. All of the ocular movements were well performed. The pupils reacted promptly to light and in accommodation. There was no nystagmus, and the visual fields were not altered. Careful examination failed to disclose a lesion of the fundus. Common and special sensibility was not deranged. The tongue, when protruded, deviated slightly to the right. Speech was monotonous, and of the character of an incomplete motor and amnesic aphasia. At times there was distinct paraphasia. There was also alexia, the patient skipping some words, reading others correctly, and not comprehending what she read. Writing was impossible on account of the paralysis of the right hand. The left ventricle of the heart was dilated and the second sound accentuated. No abnormality was found in larynx, pharynx, thoracic and abdominal viscera, and the vertebral column. The paralyzed right arm was somewhat contractured, and almost all of its muscles, as well as some of the muscles of the shoulder, had undergone a not inconsiderable degree of atrophy. From time to time small clonic movements appeared in the right hand, extending to the right side of the face, and eventually to the right lower extremity. The deep reflexes were exaggerated. The palsy and the atrophy were not so marked in the right lower extremity as in the upper. Station was tremulous and exceedingly unsteady. The cutaneous reflexes were less distinct upon the right than upon the left. The knee-jerk was greatly exaggerated upon the right side. Leg-clonus and foot-clonus were distinct. The periosteal reflexes were also increased. The left side of the body was intact, although from time to time slight tremor appeared in the upper extremity, increased by voluntary movement. The electric reactions were unchanged. While under observation the patient had several convulsive seizures, unattended with loss of consciousness or of pupillary reflex irritability. In these the eyes were moved from side to side; then followed twitching of the right thumb and the fingers of the right hand, which was thus alternately closed and opened; next succeeded twitching of the right arm, slight movements in the right side of the face, and finally in the right lower extremity. The paroxysms lasted for two or three minutes, and were attended with a sense of painful tension. After one of the attacks tremor persisted in the right leg. The impairment of memory and of intelligence progressed,

and the convulsive seizures recurred from time to time. Later in the progress of the case, occasional headache was from time to time complained of, but only upon inquiry. The left parietal region also became more sensitive to percussion than the left. The fundus oculi was still unaltered. In spite of the absence of changes in the fundus, of nausea, and of vomiting, and particularly noteworthy, of headache, a careful analysis of all the details of the case led to a diagnosis of cerebral tumor situated in the left central region. After a faithful trial of all available therapeutic measures, including potassium iodide and mercury, but without success, operation was undertaken. Upon opening the skull over the left arm centre and division of the dura, a tumor having the form and size of a large chestnut, measuring 6¼ or 6½ inches in circumference, 2.1 inches long, 1¾ inches wide, and 1 inch thick, was exposed to view. The mass was distinctly circumscribed, adherent to the membranes in only one situation, and was readily removed. It did not involve the cerebral structure, which it had only displaced. On microscopic examination, the growth presented the histologic appearances of a soft fibroma, originating from the pia. The patient unfortunately died shortly after the operation from cardiac failure.

The Venous and Hepatic Pulses and the Arrhythmic Contraction of the Cardiac Cavities.

James Mackenzie (*Journal of Pathology and Bacteriology*, vol. ii., Nos. 1 and 3) points out that, so far as clinical methods of examination are applicable to the study of the heart, they nearly all have reference to the condition of the left side; although, if carefully sought, symptoms connected with the right side are not of infrequent occurrence. Of these symptoms, the most striking and the most instructive is the pulsation of the veins, which, in a sense, bears a relation to the right heart comparable to that which the arterial pulse bears to the left. The venous pulse, however, offers a different kind of knowledge, inasmuch as it is itself a pathologic manifestation that gives information regarding the condition of both the right auricle and ventricle, while the arterial pulse affords direct knowledge of the left ventricle only. The venous pulse, too, presents a greater variety of features, and is subject to influences so subtle that it may manifest variations with the changing condition of the patient, during which the arterial pulse reveals no appreciative variation. A full comprehension of the import of these variations would enable an understanding and a combating of certain diseased conditions of the heart as yet very obscure and ill defined. As the result of an elaborate and painstaking investigation, Mackenzie has found that the form assumed by the venous pulse in the slightest degrees of cardiac derangement is that in which the movements of the auricle are added to the venous current; that is, there is a wave in the veins due to the auricular systole and a depression due to the auricular diastole. There is usually present a smaller wave (the ventricular), in the mildest forms of regurgitation, occurring after the closure of the pulmonary valves. With increase of regurgitation this ventricular wave appears before the time of closure of the pulmonary valves; but the latter portion of this wave is always the most pronounced, and the time of closure of these valves is indicated by a sudden increase in the size of the ventricular wave.

In some advanced cases of tricuspid regurgitation this earlier portion of the ventricular wave encroaches upon the time occupied by the auricular depression, and both auricular wave and depression become less marked as the ventricular wave increases, until finally the auricle ceases to impress its movements upon the venous current. The ventricular systole and diastole are then communicated directly to the venous current and produce the ventricular form of venous pulse. In the same manner the hepatic pulse may undergo variations, but the regurgitant effects are not evident in the milder cases, only occurring when there is some organic disease of the heart giving rise to forcible regurgitation. The hepatic pulse also assumes features similar to the auricular and ventricular forms of the venous pulse, with some slight modifications depending upon the difference in structure. There is also a movement communicated to the liver from the variations in size of the ventricular cavities. This movement appears to be a diastolic depression and a systolic recession, and is therefore at variance with the time usually assumed for the recurrence of these movements. When the heart's action is quickened there is a change in the form of the auricular venous pulse, consisting, first, in the disappearance of the period of stasis between the ventricular depression and the auricular wave; and, second, in a disappearance of the ventricular depression and a blending together of the ventricular and auricular waves. There is some probability that the contraction of the superior vena cava may manifest itself in the venous pulse. There is evidence that the variations in the venous pulse may be useful to indicate variations in the blood pressure, certain influences being found to further the increase and others to produce the disappearance of the venous pulse. The observation of the venous pulse, with the left heart action, serves as the best means of determining the lack of harmony between the contraction of the different heart-chambers. The cases of irregular heart-action studied are separated into seven groups: 1. Those in which there is complete agreement in relative rhythm during certain phases of irregularity of the right auricle and ventricle and left ventricle. 2. Those in which there is an exaggerated auricular impulse during this period of irregularity. 3. Those in which there is a maintenance of the periodicity of action of the right auricle during irregular action of both ventricles. 4. One in which there is a persistence of the auricular systole during a pause in the ventricular systole. 5. One in which there is a contraction of the right ventricle during a pause of the left. 6. One in which there is complete discordance in the action of the two sides of the heart. 7. One in which there is a probable displacement of the relative time of the right and left heart-movements.

Paroxysmal Tachycardia.

Lange (*Pittsburg Medical Review*, vol. viii., No. 2, p. 39) gives a good delineation of the symptom-complex included in the designation paroxysmal tachycardia, and relates two cases. He observes that examination of the patient during the attack will show that the pulse cannot be correctly counted at the radial, the carotid, or the temporal. On auscultation, it is difficult, often impossible, to differentiate the first from the second sound. The first sound may be divided, the contractions of the ventricles being asyn-

chronous. Finally, every wave of blood does not reach the radial artery. A fœtal character is imparted to the heart-sounds, which are, as a rule, distinct and clear, although at times a slight blowing systolic murmur may be heard. On palpation the impact of the heart is wanting, and is replaced by a series of diffused vibrations. Percussion demonstrates some increase in the area of cardial dulness to the left, but much more downward over the right ventricle. This increase is but transient, and disappears with the cessation of the attack. The urine passed during the attack may be of increased specific gravity, containing an excess of urates, but no albumin. The face is pale, and the lips may be cyanotic. No undue fulness of the veins of the neck and chest can be detected, and there is no cough. When an attack has continued for many weeks, the liver can be shown to be enlarged, and fine mucous râles may be heard low down behind. Therapeutically, sedatives such as the bromides, hydrocyanic acid, Calabar bean, and conium, have been found effectual in bringing the attack to an end. Cold and heat have acted similarly. In one of the cases reported the attacks could be aborted or brought to a close by deep inspirations held for fifteen or twenty seconds.

Changes in the Bone-marrow in Pernicious Anæmia.

From a careful study of five cases of pernicious anæmia, Muir (*Journal of Pathology and Bacteriology*, vol. ii., No. 3, p. 354) finds that the changes most frequently observed in the bone-marrow in this disease may be said to be: 1, An increased number of nucleated red corpuscles in the marrow; 2, transformation of the fatty marrow in the shafts of long bones into red marrow; 3, absorption of the bone-trabeculæ between the red marrow. A further change that may be found in cases of long standing is the occurrence in large numbers of large, nucleated red corpuscles (gigantoblasts), reaching 20 μ or more in diameter, often with fragmented and apparently degenerated nuclei. Along with these there is generally a distinct preponderance of colored over colorless elements in the marrow. The condition of the marrow in this advanced stage appears to be peculiar to pernicious anæmia. The newly formed marrow, in its cellular constituents and structural arrangement, closely resembles normal marrow. The eosinophile cells are specially few at first, but become more numerous afterward. The giant cells, whose development can be traced from marrow cells, are generally comparatively small and few in number. In the transformation of the fatty into the red marrow there are two main factors—viz., a widening of certain capillaries to form venous capillaries and an accumulation of marrow cells (leucocytes) around them. Afterward the demarcation of the vessels becomes deficient and the usual marrow structure reached. No special cells are concerned in the process of the absorption of bone that occurs; the gradual softening and simple atrophy appear to take place, associated with hyperplasia of the marrow. Pigment, much of which yields the reactions of iron, may be present in the newly-formed marrow in considerable amount, occurring both in the free state and also within cells. It has been found especially abundant when the anæmia was severe and progressing at the time of death. The earlier changes can only be interpreted as an extension of blood-forming tissue of compensatory nature, due to blood-destruction, the changes 1 and 2 being

similar to those that follow hemorrhage, and being found also in other diseases. The further changes found in advanced cases are also secondary, and are due to a long continuance of the same conditions, the nucleated red corpuscles showing a return to an embryonic type.

SURGERY.

UNDER THE CHARGE OF

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ANILINE PRODUCTS IN THE TREATMENT OF CARCINOMA.

MEYER (*Annals of Surgery*, November, 1893) summarizes his opinion of this method of treatment as follows: "The use of the aniline dyes in the treatment of inoperable carcinoma (malignant growths generally) is 'a palliative treatment,' not a cure. In *very* rare cases this treatment may cure. Carcinoma and sarcoma of hard type (especially sarcoma) are more influenced than soft ones; those of the soft tissues more than of the bones; those with a scanty blood-supply more favorably than rapidly growing neoplasms with abundant circulation. The disseminated cancer is not suitable for the aniline treatment. The treatment by parenchymatous injections requires a perfect knowledge and application of the principles of aseptic and antiseptic surgery."

The treatment is suitable only for inoperable cases and should never be tried where an operation is possible. It is tedious and time-robbing—the necessary precautions of antisepsis make it so—and also expensive, so that it is suitable for the rich only, outside of hospital practice. The treatment will require a continuous attendance for many weeks or months.

The method of treatment is as follows: "A very handy shape of the pure drug is the pyoktanin (cæruleum or blue) pencil. If dipped in water and then rubbed on the surface of a sore, ordinary cancerous or sarcomatous, it easily makes a crust, a dry eschar, under which cicatrization often rapidly goes on. The standard solution for parenchymatous injection is 1 : 500. It forms no sediment if filtered through asbestos. The solution is to be kept in a dark bottle with glass or rubber stopper. Only a small quantity—about one ounce—should be prepared at the time; still better is it to prepare it fresh for each injection. For external application in moist dressings a higher percentage can be applied."

The *technique* in general consists of antisepsis in instruments, hands, and skin. The needles should be kept in alcohol, and boiled after each using. "The syringe is an ordinary well-working aspirator which holds two drachms. Before and after using it is washed inside and outside with a 5 per cent. carbolic solution. It shall be used only for this purpose. The amount of solution varies from one-half to three drachms, according to the size of the growth. The spot where the needle entered is compressed after the withdrawal of the needle with a ball of moist antiseptic cotton until all oozing has ceased. It is then rubbed with ether and covered by a small piece of antiseptic gauze, fastened by pyoktanin, or iodoform, or ordinary collodium. Any other dressing is superfluous. It is wise in the beginning of the treatment to distribute the dye throughout the entire tumor as rapidly as possible. The injections are, therefore, better made every other day, later every third day regularly."

The effects produced are: 1. The analgesic; this is most important and marked. 2. The improvement of function in the part involved. 3. The general condition is unmistakably changed for the better. No dangerous symptoms have ever been seen, although occasionally there are present annoying symptoms. "In no case did the injections ever prove really harmful to the patient." A general local improvement is seen in the growth accompanied with œdema sometimes; this, however, is never serious, and disappears on massage. Breaking down of the injected tissue is sometimes seen, and a number of sinuses may form or may unite to form a cavity that, if punctured and treated antiseptically, heals quickly. In general, the effects of this method of treatment are favorable, and the author believes there have been cases cured, though it is a palliative rather than a curative treatment, and produces best results as such.

The Technique of Gastrostomy.

Nicolaysen (*Centralbl. für Chir.*, 1894, No. 4) reported three successful operations, forming gastric fistulæ, that closed of themselves and through which the patient was fed by means of a soft catheter. The fistulæ are direct. The self-closure of the fistula was secured by making a small abdominal opening so that the parietal wall acted as a sphincter. The incision was made parallel to the left costal line; this makes attention to the muscles unnecessary. The serous surface of the stomach was scarified with the point of a needle. In a circle about this area four or six stitches, including the serosa and muscularis, were placed and then carried through the margins of the abdominal wound and tied over rubber drainage-tubes. The serous surface was then sewn to the peritoneum and abdominal muscles within the wound, which was afterward closed by deep and superficial sutures. The opening can be made immediately, or twelve to twenty-four hours afterward, just sufficiently large to admit a Nélaton catheter.

Primary Sarcoma of the Arachnoid.

Reymond (*Bull. de la Soc. Anat.*, Dec., 1893) reports a very interesting case of a man, thirty-three years of age, having no previous history that bore upon the subject. When first seen he supported himself on two attendants and

could not walk without them; the next day he could not support himself, but at no time was he paralyzed in the full sense of the word. There was no anæsthesia. He cried out when touched. The pupils were dilated. There was amaurosis. There was no albumin in the urine. The psychical symptoms were the most characteristic. There was constant delirium, but not of the ordinary type—it was not noisy as in delirium tremens. His body was calm, but he seemed preoccupied by his business affairs. His temperature range was from normal to 100.4°.

The autopsy disclosed a tumor situated beneath the right orbital lobe, attached to the brain and adherent to the dura mater. The microscopical examination showed it to be a sarcoma not uniform in structure; the portion next to the brain was more vascular, the arteries were enlarged and their walls thickened by infiltrated sarcoma cells. The sarcomatous cells were large and flattened and a little heaped up one upon another. The further from the gray matter the less vascular the tumor became and the more elongated the cells, and formed into fasciculæ. The newest portion of the growth was apparently that next to the brain.

The tumor in portions was not sharply defined from the brain, in others it was separated by hemorrhagic areas; a careful examination showed these to be situated at the position of the sulci, between the convolutions. On the cerebral side of these hemorrhagic areas the pia mater could be clearly seen, while in the intervening portions corresponding to the convolutions it was absent. It thus became evident that the tumor arose from the arachnoid primarily, that the hemorrhage occurred beneath that membrane in the sulci, where it is normally separated from the pia mater, and thus prevented the destruction of the pia which had occurred over the convolutions.

Studies of the Intestinal Form of Peritonitis.

Under this title P. Ziegler (*Rieger, München*, 1893, pp. 58; *Centralbl. für Chir.*, Feb., 1894) studies: 1. The power of bacteria to pass through the strangulated intestine. He concludes that so long as the glistening appearance remains and until there is a fibrinous deposit, they cannot penetrate. 2. The most infectious form of bacteria is the bacterium coli, and that fecal matter carries the infection. Without bleeding, the perforation of the intestine and passage of fecal matter, either solid or in solution, into the peritoneum, will cause a fatal peritonitis. The smaller the amount the more lingering the death. Very small quantities may be eliminated. The fewer the corpuscular elements in the extravasated matter the less virulent the infection. Death is caused by nerve irritation.

Operative interference is indicated: 1. For all punctured and incised wounds immediate laparotomy, except when the wound is large enough for all purposes. 2. For gunshot wounds the same treatment. 3. For all small punctured wounds immediate enlargement of the wound followed by laparotomy if necessary.

An Enormous Epithelioma of the Right Kidney.

Bernard (*Bull. de la Soc. Anat.*, Dec., 1893) reports the case of a rheumatic atheromatous patient having in the right side of the abdomen a tumor

which had been there for seven years. There had been two hæmaturiæ in six months previous, with lumbricoidal clots passed in the five following days. There had been no subsequent hemorrhage. Physical signs were an enormous tumor of the right kidney; emaciation; yellow color. There had been persistent vomiting until three months before death. The urine was characteristic of interstitial nephritis, density low, pale in color, abundant, and always without albumin. In the three last months a perinephritis developed which opened on the thigh by way of the psoas muscle. There were sacral and trochanteric eschars and ulcer of the right cornea.

The autopsy showed a tumor extending from the liver to the iliac crest. Its relations were as follows: Beneath cæcum filled with gas; in front colon flattened out; in its upper portion the colon formed a very acute angle, so that the initial portion of the colon, distended with gas, passed over the antero-lateral aspect of the tumor. The mesentery of the small intestine and the duodenum arose from the posterior surface of the tumor. The aorta and vena cava were not involved.

The Diagnosis of Posterior Urethritis.

Lohnstein (*Deut. med. Wochenschr.*, 1893, No. 44) believes that in the methods of Thompson and Goldenberg-Jadasson there are fallacies introduced by the regurgitation from the pars membranacea into the bladder and through the action of the compressor urethral muscle. He advises the following method of procedure: The anterior portion of the urethra is washed out by means of a Nélaton catheter with a 0.5 per cent. solution of potassium ferrocyanide until there are no threads in the water. Then there follows a washing with warm water until the water does not give the Berlin-blue reaction upon saturation with chloride of iron. The patient then urinates, and the urine is examined for threads by adding chloride of iron.

There are possible the following four conditions: 1. The urine is clear and remains yellow on the addition of the chloride of iron. 2. The urine is clear, but turns blue on the addition of the chloride of iron. 3. Threads are present, but the urine remains yellow. 4. Threads are present and the urine turns blue. Only in the last condition is a certain diagnosis impossible; in the other three it is clear. Only further and later examination can decide in the last form.

Suppurative Pylephlebitis; Laparotomy; Recovery.

Frederick Treves reports the following very instructive case (*Lancet*, London, 1894, vol. i., No. 11): A young lady, aged fifteen years, was seized with symptoms of perityphlitis, ten days after an ocean voyage, during which, in addition to full meals, she had eaten large quantities of nuts and candy. She had an attack of perityphlitis four years before, and another two years prior to the one reported. She was of constipated habit. The attack began with sudden pain in the abdomen, vomiting, coated tongue, and moderate fever, which reached 104° on the third day. The symptoms gradually ameliorated, until the eighth day, when there was a severe rigor, the temperature registering 103°. The condition was thought to be due to stercoral ulcer. From this time on she pursued an irregular course, gradually becoming weaker and

more emaciated as a result of her disease, with the accompanying fever and vomiting. On the thirty-first day Mr. Treves was asked to perform exploratory cœliotomy on the supposition that an abscess of the liver existed. At this time the patient was very ill, she was emaciated, very prostrate, the forehead was wrinkled, and she appeared in a state of ceaseless anxiety. Pain was complained of "all over," but marked tenderness was manifest only over the liver.

An incision was made in the right semilunar line. There were no peritonitis, no ascites, and no adhesions. The cæcum appeared normal; the appendix was healthy and freely movable. The gall-bladder exhibited no morbid changes. The appearance of the liver was remarkable. It was enlarged, of normal color, but its consistence was as soft as a lung. All of the exposed portion was dotted with minute yellow specks, perfectly round, and the size of an ordinary pin-hole; they were not perceptible to the touch. The region of the fissure of the portal vein was examined, but nothing peculiar was noted. The patient made a rapid and uninterrupted recovery, and at the time of the report, eighteen months after the operation, her health had remained sound.

It is suggested that the case was one of typhlitis or perityphlitis followed by pylephlebitis. The points of particular interest are: 1. All cases of perityphlitis do not depend upon a previous appendicitis, even where there have been repeated attacks (in the present case the appendix was entirely healthy). 2. The rapid and complete recovery following exploratory cœliotomy; and 3. Recovery after pylephlebitis. In connection with the second feature, the author calls attention to the monograph of J. William White on "The Curative Effect of Operation *per se*," in which a very large number of cases have been collected where simple exploration has been followed by amelioration or cure of apparently malignant conditions.

Treves has seen one other case in which recovery took place. The text-books teach that the condition is commonly fatal.

Operative Treatment of such Herniæ as Appear the Result of Congenital Defect of the Linea Alba or as the Outcome of Laparotomy.

M'Ardle contributes the following interesting observations to the *Dublin Journal of Medical Science*, 1894, 3d series, No. 266. The first case described is that of a woman, aged fifty-one years, who had had for many years a small nodule beneath the skin above the umbilicus. Suddenly, during an effort at lifting, an umbilical hernia developed. This was operated upon by the author, and was found to consist of a knuckle of small intestine and a large mass of omentum. The latter was so much altered that it was necessary to excise it. Patient made a complete recovery. The nodule alluded to was found to be a sub-peritoneal fatty hernia. The author remarks that if this had been operated upon, the hernia would doubtless not have developed.

The second case was a woman with an irreducible umbilical hernia the size of a child's head, who was brought to the hospital with symptoms of strangulation. Operation was performed promptly, the intestine being returned and the omentum ligated and excised because the numerous adhesions

would require more ligaturing than the stump; the abdomen was already full as it could well be, and finally the mass showed a low grade of inflammation. The author remarks that life was saved by prompt operation, and intra-abdominal pressure lessened by removing the large mass of omentum, while clearing the edges of the ring, applying a purse-string suture to the neck of the sac, an interrupted suture to the aponeurosis, and deep supporting sutures through the skin fat and abdominal fasciæ resulted in a permanent cure.

The next case was a ventral hernia, following laparotomy, in a woman of twenty-seven. The operation was carried out as in the preceding case. The author explains the occurrence of these herniæ as due to a deficiency of the aponeurosis formed by the union of the external oblique, internal oblique, and transversalis muscles. In the first two cases the cause of the defect was apparent; in the latter it followed laparotomy. The failure of this middle layer of the abdominal wall to unite after incisions is ascribed by M'Ardle to—1. Failure to engage the different layers of this stratum sufficiently in the sutures. 2. Interposition of contuse peritoneum. 3. Hæmatoma not becoming soundly organized. 4. Suppuration from inherent or extrinsic causes. The remedy is the suture of the abdominal wall after cœliotomy as for hernia, to obliterate all cavities in which blood or serum could collect, and by avoiding contusion of the peritoneum by using sharp-pointed catch forceps.

These cases are important in emphasizing the fact that umbilical herniæ, contrary to the usual teaching, are to be treated upon the same general principles as herniæ in other regions.

Suture of the Bladder and the High Cut.

In a communication to the *Wiener medicinische Presse*, 1894, Nos. 1 and 2, Albert urges the claims of the high cut in cases of vesical calculus. He reported his first case of this operation eighteen years ago, and since this time has been enthusiastic in its praises. Brenner and Guyon contend that the value of the operation depends entirely upon the success of the bladder-suture. He quotes Volkmann, who said in 1884 that "lithotripsie and lith-olapaxy do not belong to our antiseptic times." The improvements in the operative methods for vesico-vaginal fistula in recent years have been useful in indicating the proper technique in suture of the bladder.

Albert's method is as follows: He does not use Petersen's bag. A thread is introduced in the bladder at each end of the proposed incision. These serve to steady the bladder and draw it forward. If successful suture is to be obtained, it is important not to carry the incision down behind the symphysis. If a larger wound is needed, the bladder may be stripped of its peritoneum by blunt dissection and the incision extended in this direction. It is fatal to the cause of primary union of the bladder-wall to draw a stone out through a wound of insufficient size, thereby lacerating and contusing the edges of the latter. If the edges have been lacerated, they should be freshened. With the exercise of great care primary union may sometimes be obtained, but it will be rare. The author contends, however, that this should not induce surgeons to abandon the high operation, but to improve the

technique, so that success may follow more frequently. If primary union, cannot be obtained, however, the wound may be drained.

A Simple Apparatus for the Sterilization of Catheters.

Frank describes (*Annales des Maladies des Organes Génito-urinaries*, 1894, No. 2) his apparatus for the sterilization of urethral catheters and similar instruments. A sterilizer of suitable size is used. In one end is adapted an upright reservoir, to be filled with water, or, better, 1 per cent. solution of potassium. From the top of this project horizontally several conical tubes to which the catheters are attached. Rubber tubing may be used to make the connections more perfect. The instruments are sterilized externally in the usual manner by the steam from the sterilizer, while the inner surface is made sterile by the jet of steam which passes through from the reservoir described. The reservoir is heated by the liquid in the sterilizer. Frank has infected old and rough rubber and silk catheters with urine from cases of cystitis, and, in addition, pure cultures of the bacterium coli commune, and of charbon, and from these tube cultures were made, which showed abundant growths at the end of three days. After sterilizing ten minutes, tubes were again inoculated, but they remained sterile.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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OF PHILADELPHIA.

Separate Investiture of the Palato-glossus Muscle.

Under the title "Congenital Loss of Substance of one Palatine Pillar" (*Rev. de Lar., d'Otol., et de Rhinol.*, 1894, No. 4), Dr. Seifert, of Würzburg, reports a unilateral instance of separate investiture of the palato-glossus muscle of the left side, which he has recently observed in a man twenty years of age. A good woodcut shows the tonsil through the slit in the palatine fold. A number of reported cases are collated. These cases are not extremely rare. One or two of them show up every year or two in large throat clinics. Occasionally, as in an instance reported by Schapringer, the defect occurs in a subject with hare-lip, an association very rare.

Amputation of the Tonsils.

Dr. Whitfield Ward claims (*Medical News*, 1894, lxiv. 169) that deep injections of from thirty to sixty drops of a mixture of 10 per cent. solutions of cocaine hydrochlorate and of ferrum sulphate in equal parts, will render amputation with the amygdalatome practically bloodless or nearly so.

Cerebellar Disease as a Cause of Tremor of the Vocal Bands.

Tremor of the vocal bands has usually been attributed to disseminated sclerosis of the medulla. A case from Garel's clinic, so reported by J. Collet two years ago, terminated fatally, and at the autopsy Dr. Collet found (*Annales des Mal. de l' Oreille, du Larynx, etc.*, 1894, No. 2) an entire absence of disease of the medulla, with freedom from any alterations in the nuclei of the hypoglossal and pneumogastric nerves, or in their intrabulbar fibres. On the other hand, there was atrophy of the cerebellum and of the bulbo-protuberances, the particulars of which have been described in the *Archives de Neurologie* for November, 1893. This case is made the text of a short but very interesting article with a number of references in point, and concluding as follows:

There is a systematized sclerosis of the cerebellum and of its bulbo-protuberantial extensions, which may give rise to the majority of the symptoms ordinarily assigned to *sclérose en plaques*.

There are troubles of speech and of phonation manifestly caused by this lesion of the cerebellum, inasmuch as the cranial nerves and their nuclei remain sound.

That tremor of the vocal bands is not an exclusive result of *sclérose en plaques*, but may likewise be encountered in sclerous atrophy of the cerebellum, and that consequently it cannot be referred to a mechanism always identical.

Laryngeal Paralyses.

The difficulty sometimes encountered in recognizing the origin of laryngeal paralysis has been well exemplified in the case following:

At the meeting, December 1, 1893, of the Society of Laryngology of Berlin, Dr. Grabower presented (*Annales des Mal. de l' Oreille, du Larynx, etc.*, 1894, No. 2) a patient with tabes dorsalis and paralysis of the left recurrent. These lesions were stated to be of central origin; and the absence of any motor impairment of the sterno-cleido-mastoid muscle was urged as a proof that the spinal accessory nerve is not concerned in the motor innervation of the larynx. At the next meeting of the Society, January 12, 1894 (*idem*), Grabower reported that in the interim his patient had died of intercurrent pneumonia, and that at the autopsy an aneurism of the aorta was discovered, which had eroded the first and second dorsal vertebræ and the lower cervical vertebræ. Nothing was amiss with the recurrent nerves. Consequently the paralysis had not been one of central origin, but a peripheric paralysis of the larynx. The intensity of the pulmonary emphysema had rendered the diagnosis of aneurism impossible during life.

At the earlier meeting, Grabower supported his opinion concerning the spinal accessory nerve by the statement that he had found morphological differences in the sensory and motory nuclei of the pneumogastric, and between these and the nucleus of the spinal accessory; and he contended that his view was confirmed by the success of an experiment of Deak, which he had reported with the same result, namely, that he had divided the pneumogastric nerve and had torn away the peripheric end, with resultant degenerescence of the motor and sensory nuclei of that nerve while the nucleus of

the spinal accessory remained intact. At the later meeting he exhibited a preparation showing the relations between the roots of the pneumogastric and those of the spinal accessory nerve.

Lymph Follicles of the Pharynx, Larynx, and Trachea.

Z. Dobrowloski, in a prize essay (*Pam. tow. lek. Warsc.*, t. lxxvii.; *Internat. Centralbl. für Laryngologie, etc.*, 1894, x., No. 7), describes his researches as to lymph follicles in the mucous membrane of the pharynx, stomach, larynx, trachea, and in those of the vagina. Microscopic examination of the œsophagus in twenty-three human subjects and in eleven animals of different species, led to the conclusion that in the majority of cases there are no lymph follicles in the healthy human œsophagus. In nine specimens affected with chronic inflammation, lymph follicles were observed chiefly in the upper portion and on the anterior surface. They were directly beneath the epithelium, and the excretory ducts of the acinous glands were usually located in the middle of the follicle.

Adenoid tissue was uniformly found in the pyriform sinus, principally in circumscribed small-celled infiltration. In eight cases the congruence of the gland tissue was very similar to that of the tonsils. So the author names it the laryngeal or the pyriform sinus tonsil.

Lymph follicles were found sparingly here and there in the healthy human larynx, and especially in the ventricle, interarytenoid fold, and the petiolus of the epiglottis. Under chronic catarrhal conditions the lymph follicles are rather copious in the same localities.

Amygdaliths.

Dr. Walter B. Johnson, of Paterson, N. J., reports (*Annals of Ophthalmology, etc.*, 1894, No. 1) an interesting instance of "tonsilliths" expectorated spontaneously at intervals with considerable hemorrhage after each expulsion.

Suppuration in the Maxillary Sinus.

In an article by Dr. Marcel Lermoyez on the treatment of sinusites at Vienna (*Annales des Mal. de l'Oreille, du Larynx, etc.*, 1894, No. 1), the attempt at evacuation by the natural passage is criticised as irrational because the opening is deeply concealed behind the inferior lip of the hiatus semilunaris, and because even though the beak of a syringe be successfully engaged within the orifice it would be extremely difficult to push it on into the cavity of the sinus, inasmuch as the ostium forms a canal directed from above downward and from behind forward—a direction exactly opposite to that of an instrument which has been placed in the middle meatus.

Furthermore, the sinus cannot be thoroughly washed out even when the canula has been inserted, because the passage is too narrow to admit of the discharge of gummous pus; and it has so happened that observers have extracted large masses of congealed pus by way of a large alveolar opening, when lavage by the natural orifice had extruded nothing but the liquid injected returned slightly turbid.

Puncture through the middle meatus is objected to as not only being at too high a level, but as exposing the orbit to the risk of penetration. Puncture through the lower meatus is objected to because the necessary ablutions are very painful and cannot be executed by the patient.

The alveolar puncture is deemed preferable in all cases except where it is necessary to scrape the sinus, and then the sinus should be entered from the canine fossa.

[These are views with which the compiler of these notes is in full accord.]

Naso-maxillary Myxosarcoma.

This case, observed in a child five years of age, is reported by Dr. C. W. Richardson, of Washington (*Annals of Ophthalmology, etc.*, St. Louis, 1894, No. 1). It is unusual, from the extreme youth of the patient whose disease began to attract notice toward the second year of his life. Dr. Richardson removed an extensive growth from the nose and pharynx, using the wire snare and forceps, without anæsthesia—a very wise precaution under the circumstances, although the hemorrhage was far less than is anticipated from malignant growths in this region. Within six days a reproduction of growth occurred almost equal in magnitude to the original mass. Under chloroform anæsthesia Dr. Richardson now exposed the parts from the exterior, and finding the maxillary sinus involved, he removed the bony mass entirely, separating it from the pterygoid process. The cavity was carefully freed from morbid tissue, and was then packed with iodoform gauze; and the integumentary flaps were carefully sutured into proper position. Recovery was prompt and apparently satisfactory. Recurrence took place, however, after an interval of some three weeks, and in five weeks the growth had acquired enormous proportions, filling out the whole cervical region extending from the mastoid process to the clavicle. A smaller growth had become developed on the opposite side just above the clavicle. During the week growths were noted in the lateral walls of the pharynx, and in the left cervical region; but there was not any recurrence in the nasal cavity. Death by inanition and exhaustion ensued four months after the operation.

Plastic Reconstruction of a Vocal Band.

Our record is copied from the *Internat. Centralblatt für Laryngologie, etc.*, January, 1894, x., No. 7; "Laryngo-fissure, Extirpation, and Plastic Reconstruction of the Right Vocal Band; Recovery." Störk performed the tracheotomy and Gesurny the laryngo-fissure. Gesurny cut out the vocal band, partially loosened up the ventricular band, drew it downward, and sutured it so that it formed a substitute for the vocal band, and rendered a good closure of the glottis possible, though it did not participate in the movement. The glottis, however, was rendered narrow. Ten days after the operation the voice was quite loud and tolerably clear, and so remained.

Traumatic Epilepsy, Nasal in Origin.

Dr. Thomas J. Harris, of New York, reports (*Annals of Ophthalmology, etc.*, 1894, No. 1) a case of traumatic epilepsy traceable to the result of a blow

on the nose, which had fractured the vomer, distorted the perpendicular plate of the ethmoid, and dislocated the cartilaginous septum to such an extent as to shut off all respiration on the right side. After a series of operations for restoration of the respiratory function through the occluded orifice, the patient was freed from his liability to epileptic seizures.

The author refers to a case reported by Dr. S. Weir Mitchell, in THE JOURNAL, 1889, in which traumatic epilepsy had been induced by the sojourn of a foreign body in the nose. Complete cure of the fits resulted after removal of a bean, and proper ablutions with astringents.

PARTIAL DESTRUCTION OF THE CARTILAGINOUS TRACHEA, AND STRICTURE THE ENTIRE LENGTH OF THE TRACHEA; RELIEF BY PLASTIC OPERATION.

LARDY and PHOTIADES, of Constantinople, report this unique case (*Rev. Méd. Suisse Romande; Internat. Centralbl. für Laryngol., etc.*, 1894, x., No. 7). The destruction of the trachea in a man twenty-three years of age, otherwise perfectly well, had occurred long ago, and the cause could not be determined. There were no evidences of syphilis, tuberculosis, or other disease. The patient wore a canula, but did not know for what cause tracheotomy had been performed. The compiler of the notes in the *Centralblatt* suggests diphtheria, arguing from the destruction of the walls of the trachea. The cavity of the lower portion of the larynx and of the upper portion of the trachea was filled with granulation tissue.

After splitting the larynx and scraping out the trachea, a tracheal tube of hard rubber was temporarily inserted, over which an anterior flap was adjusted partly of skin and partly of a periosteal flap taken from the right clavicle.

The patient still requires frequent tubage, but breathes comfortably without a canula, speaks with a fairly normal voice, and is fully competent to do his work.

TRANSLUMINATION IN THE DETECTION OF PUS IN THE MAXILLARY SINUS.

DAVIDSOHN, a year or so ago, drew attention to the illumination of the eyeball by incandescence from the electric light in the mouth as a surer indication of freedom of the antrum from purulent products than is incandescence of the cheek over the region of the antrum; and now BURGER contends (*Rev. de Lar., etc.*, 1894, No. 1) that luminous sensations in the eyeball are far more distinctive tests than illumination, as a very feeble light will suffice to excite the subjective sensation.

OSSEOUS OBLITERATION OF THE POSTERIOR NASAL OUTLETS.

IN a rather prolix, though classically arranged paper, MM. HOUGENHEIM and HILARY refer more or less briefly (*Annales des Mal. de l'Oreille, etc.*, 1894, No. 1) to all recorded cases of occlusion of the choanæ which have come to their knowledge, and then detail a case of their own. A girl, fifteen years of age, of characteristic adenoidal expression, was found to have, in addition to her adenoids, a congenital osseous obliteration of the posterior nasal outlet of

the left side. She had been very hard of hearing on this side since her infancy. Some months after removal of the adenoids the obstructing partition was drilled through after unsuccessful attempts at perforation with the electric cautery; the opening was enlarged with the cautery, and then packed with iodoform gauze. There was so considerable a disposition to closure of the aperture that more than thirty subsidiary operative procedures were necessary to combat it successfully. Six months later, the patency had remained constant, with great improvement in the various physical and intellectual functions.

Following this report, the little treatise is continued in a systematic summary containing the gist of all that has ever been written upon the subject and the conclusions to be derived therefrom.

A Rare Variety of Nasal Myxoma.

Dr. Luc reports (*Arch. Internat.*, No. 6) the case of a man, twenty-eight years of age, who had a growth completely obliterating the left nasal passage. Though it resembled an ordinary polyp it bled profusely at the slightest touch. With considerable difficulty it was eventually removed, practically by evulsion with a double curette passed beneath it, and the hemorrhage was so profuse as to produce demisyncope. The growth was of the size of a large prune, and of irregular configuration, defying all comparison. A detailed account of the histological investigation is given, illustrated by a number of woodcuts.

It appeared to be an inflamed myxoma in way of active sarcomatous transformation.

Sarcoma of the Tonsil.

The case was reported to the Société de Chirurgie, November 28, 1893 (*Universal Medical Journal*, January, 1894). A young man had suffered for three or four months with an indolent enlargement of the tonsil, which had acquired the bulk of a large mandarin orange, and had invaded the soft palate, the wall of the pharynx, and the base of the tongue. It was safely removed as follows, with satisfactory results and without inflammatory sequence:

The tissues of the cheek, from the commissure as far back as the perpendicular ramus, were incised along the lower edge of the maxillary bone, and dissected off, leaving the mucous membrane of the mouth undisturbed for the time being. The flap was dissected upward, exposing the submaxillary region, from which the ganglia and submaxillary gland were then removed. The external carotid was ligated, though with difficulty, and it is to this feature of the procedure that the freedom from subsequent inflammation was attributed. Then the mucous membrane still adherent to the jaw was severed and turned upward, exposing the tumor freely when the mouth was widely opened. The palatine and pharyngeal attachments were severed with the thermo-cautery, but it was necessary to remove a large portion of the tongue in order to include the lingual contingent of the neoplasm. The parts were then brought together and dressed. Solutions of chloral were used daily as an antiseptic, and in twenty days the patient was discharged entirely cured.

Sarcoma of the Nose.

Dr. Onodi, of Budapest, reports (*Rev. de Lar., etc.*, 1894, No. 1) a case in a man fifty years of age. The disease began early in 1888 as one of multiple bilateral benign polypi, with recurrence toward the close of the year in a mixture of growths benign and malign in one passage only. Evulsion of the growths and igneous cauterization of the suspicious places procured uninterrupted relief for ten months. Eleven months later one side of the nose was filled up again with growths, this time exclusively sarcomatous; the other side remaining entirely free of them. The nose was resected, and complete extirpation practised, including the turbinate bodies. Suppuration was found involving the lacrymal sac, the frontal sinus, the sphenoidal sinus, and the ethmoidal cells; all which parts were thoroughly cleansed.

The patient has been doing well ever since.

Epithelioma of the Larynx.

Dr. Semon reports (*Journ. Lar., etc.*, 1894, No. 1) an instance of coexistence of epithelioma and of papilloma in several specimens from a growth, and without any evidence of transition into the one from the other. It is the case of pedunculated angioma reported by Semon and Shattock in the *Trans. Path. Soc.* of 1891.

Four months and a half later recurrence of undoubted epitheliomatous nature took place; and so the basis of the growth was entirely removed through the incision of sub-hyoid pharyngotomy. On the third day after the operation the patient suddenly became comatose, the temperature rose to 107°, and death ensued twenty-four hours later. No clue to the cause of coma and the fatal issue could be determined at the post-mortem examination. The case is important as the first known instance of malignant disease of the larynx beginning in a pedunculated angioma.

Thyroidal Growths penetrating into the Air-passages.

Dr. Semon has called the attention of the Laryngological Society of London (*Journ. Lar., etc.*, 1894, No. 1) to the tendency of infiltrating malignant disease of the thyroid gland to become pedunculated when perforating into the large air-passages. [Is there a sort of wire-drawing process permitting the freed portion to expand while the incarcerated portion remains constricted?—Compiler.] The fact was illustrated first by a specimen of cylinder-celled carcinoma from a man thirty-nine years of age, whose case had been reported in the *Trans. Path. Soc.* for 1888. A second specimen was one of epitheliomatous disease, in which pedunculated projections repeatedly grew into the trachea. One of these projections had apparently completely sloughed away.

Inverse Action of the Vocal Bands.

Dr. Max Scheier, of Berlin, in an article on this subject published in the *Arch. Internat. de Laryngologie, etc.*, No. 6, reports a recurrent instance in a female operative forty-three years of age. On a number of occasions,

some of them while in the hospital under treatment for non-laryngeal disease, she had been suddenly seized with asphyxiative dyspnœa of such intensity as to have apparently demanded tracheotomy. Sometimes these paroxysms had subsided as suddenly as they had commenced; sometimes slowly; sometimes with recurrence on exertion during periods of several continuous weeks. When, under laryngoscopic inspection, the patient attempts to take a deep inspiration, the vocal bands become pressed together so as to completely close the glottis anteriorly, the right vocal band sometimes crossing on top of the other one; but there remains a triangular opening posteriorly, due to persistent paresis of the transverse muscle. During sleep respiration is performed in a normal manner. All treatment attempted, topical and constitutional, has failed to be of any service whatever.

Compression of the Trachea.

Mr. Bernard Pitts records in the *Lancet*, No. 3654, an instance of a bronchocele of eight years' standing compressing the trachea of a lad fifteen years of age, who was brought into St. Thomas's Hospital cyanosed and insensible from intense dyspnœa. Mr. Pitts tried to relieve the labored respiration by venesection from the external jugular vein; and failing, succeeded in opening the trachea and in re-establishing respiration by artificial means. On account of hemorrhage and disturbance to the thyroid gland, that structure was removed. Although the patient did well for twenty-four hours, he died two days later from broncho-pneumonia. The record is accompanied with an illustration of the anatomical condition of trachea and surrounding structures.

Double Nose with Two Cartilaginous Septa and Three Nares.

The case is reported and depicted (*Rev. de Lar., d'Otol., etc.*, 1894, No. 1) by Dr. E. Baumgarten, of Budapest. The supernumerary orifice is irregular in outline and is located above the normal nares and in the middle line. This anomaly of development is regarded as similar to that by which harelip is produced. The patient was but eight weeks old when the case was reported, and at some future date an attempt will be made to correct the deformity.

Argyria from Silver Nitrate.

Dr. Onodi, of Budapest, reports (*Rev. de Lar., d'Otol., etc.*, 1894, No. 1) an instance in a syphilophobic man sixty-two years of age, who, for some ten years, had pencilled his throat every two or three days with a very strong solution of silver nitrate made in a rule-of-thumb way from the crayon. About five years ago the face and brow began to get gray. At present the discoloration is pronounced in the brow and face; the lips are gray, the teeth black, the gums gray over their entire extent and with a black border close to the roots of the teeth, the inferior surface of the tongue is gray, the soft and hard palate are grayish, and the pharynx is of a pronounced gray. The larynx is not discolored.

Dr. Onodi had also reported (*Monatsh. f. Ohr., etc.*, 1888) a case of argyria

in a man with cancer of the larynx, due to inhalation of a 10 per centum solution of silver nitrate during some three years. The case is described with its autopsy and microscopic examinations. Even the choroid plexus had become completely blackened.

Suppuration in the Maxillary Sinus.

Dr. H. Burger, of Amsterdam, records (*Rev. de Lar., d'Otol., etc.*, 1894, No. 1) two interesting cases of suppuration in one maxillary sinus, with purulent rhinitis in the posterior portion of the nasal passage upon the opposite side. This he accounts for by the transfer of the products of suppuration from the diseased sinus out of the nares posteriorly and into the other around the septum, while the patient is lying at night on the sound side. He therefore deems it a duty in every case of unilateral rhinitis to entertain the possibility of suppuration in the maxillary sinus of the opposite side.

OBSTETRICS.

UNDER THE CHARGE OF

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Bilateral Facial Paralysis Due to Injury by Forceps at Birth.

Edgeworth (*British Medical Journal*, 1894, No. 1723). The patient, when shown before the Bristol Medico-Chirurgical Society, was seven years old. From birth she had suffered from bilateral facial paralysis. Expression lines were absent. The child could not frown or raise the eyebrows, but could partially close the eyes by relaxing the levatores palpebrarum; there was no movement of the orbiculares oculorum. The lower lids were very thin, with an upper border more concave than normal, slightly dropping away from the eyeballs. No movement of the ear, nose, or cheek muscles could be found. On testing the patient's speech it was found that she could pronounce labials, though not very distinctly, but labio-dentals with more difficulty, and there was a tendency to replace the latter by anterior-palato linguals. The bones of the face were well developed. There was no deafness, no evidence of otitis media or loss of taste. The palate moved well. No response to either the constant or interrupted current could be obtained. The mother gave a history of a long labor, lasting three days with a difficult forceps extraction. The author considers the case to be one of double peripheral facial

paralysis, complete in the upper part of the face, but incomplete in the lower portion, and due to forceps pressure at birth. The good development of the facial bones is an interesting feature, as the facial nerve is not supposed to supply these structures.

Symphysiotomy.

Pinard (*Annales de Gynécologie*, January, 1894), reports the histories of 13 cases of symphysiotomy in the clinic of Baudelocque during 1893. Of the above cases, 9 were multiparæ and 4 primiparæ. Regarding the deformity for which operation was done, 10 had rhachitic and 3 generally contracted pelves. Twelve of the mothers lived, and one died. The children (thirteen) all lived. No accidents were encountered during the operations, although many of the patients had bad obstetric histories. Hemorrhage, other than that occurring at the time of section of the symphysis and subpubic ligament, was easily controlled by a tampon. Twice during the extraction of the fœtus a tear occurred in the anterior vaginal wall, making this canal communicate with the field of operation. All these tears were in primiparæ. A vaginal tampon of iodoform gauze was sufficient to produce primary union in both.

In one case there was a lesion of the bladder, resulting in a vesico-vaginal fistula. A pelvic deformity complicated with ankylosis of the right inferior extremity formed an unyielding point against which the bladder, during extraction of the fœtal head, was pushed. The patient recovered.

In one case there was incontinence of urine, which existed some days after delivery. No injury to the bladder was present. The trouble yielded later to electricity.

The only fatal termination was in a case with contracted pelvis. Liquor amnii was fœtid. Notwithstanding antiseptic treatment to uterus and vagina, the woman died on the ninth day of septicæmia produced by staphylococci. The child lived.

Experience has shown the author that it is well, particularly in primiparæ, to dilate the birth canal by means of the balloon of Champetier de Ribes before section of the bony pelvis, and to avoid tearing the soft parts of the mother at the moment of birth; the danger of the latter being considerably reduced by practising the precaution (indicated by Varnier) of adducting the legs when the head is engaged. In cases where the head is very high, the author considers it preferable to aid the engagement of the head when in the grasp of the forceps by pressure over the abdomen rather than to let it engage alone.

In closing his report, Pinard draws the following conclusions:

1. Induced labor should be abandoned in all cases in which symphysiotomy permits the passage of the head of a fœtus at term.

2. Abandon all applications of the forceps where osseous resistance exists, either at the superior strait, in the pelvic cavity, or at the inferior strait.

3. Embryotomy on the living infant must be absolutely abandoned.

4. The pelvis should be enlarged temporarily by symphysiotomy, pubiotomy, ischio-pubiotomy, or coccygotomy in all cases in which osseous resistance is not conquered by the head well flexed and when calculations demonstrate that section of the pelvis will permit the passage of the head.

5. Amputation of the uterus and ovaries in cases of complete pelvic narrowing.

He abandons all applications of the forceps at the superior strait because of the danger of fracture of the fœtal skull.

Induced labor he abandons, because in many cases infants are born which are not viable, the operation frequently comes too late, and (a point to which he calls special attention) the most recent investigations of neuropathologists have demonstrated that an infant born with difficulty before term may be affected with cerebral diplegia.

A Case of Rudimentary Bicornate Uterus with Deficient Vagina.

Beuttner (*Centralblatt für Gynäkologie*, 1893, No. 49) reports in detail a case coming into the service of the University Frauenklinik at Bern. The patient was eighteen years old, and had a somewhat tuberculous history. There was amenorrhœa without vicarious hemorrhages of any kind. Considerable pain had existed for some time in the sacral region, so that walking was impossible. The vagina existed only as a narrow slit. Examination per rectum and externally by the abdomen detected the absence of the uterine body, and on opening the abdomen the following interesting condition was found: The uterus was represented by a band two centimetres broad, extending across the pelvis and covered by peritoneum which was reflected from the vagina and rectum. The right ovary was enlarged. Both ovaries, tubes, and the horns of the uterus were clamped with forceps and removed, the stumps being treated with the thermo-cautery. A parovarian cyst the size of a cherry, associated with a daughter cyst, was found.

A longitudinal section of the enlarged ovary showed three cysts containing a yellow serous fluid and blood. The ovarian tissue was infiltrated with yellow serum, and upon its upper surface follicles filled with dark-red blood could be seen.

The right uterine stump contained evidences of a cavity. No trace of the round ligaments could be found. It was impossible to tell exactly how far apart the uterine horns had been in the pelvis, because they were drawn from their original position during the exploration.

On microscopic examination the tissue of the rudimentary uterus was found to be normal, with rich development of muscular tissue, the muscle bundles alternating with small septa of connective tissue.

Normal Pregnancy and Delivery after Vagino-fixation.

Dührssen (*Centralblatt für Gynäkologie*, 1893, No. 49) reported at a meeting of the Gesellschaft für Geburtshülfe und Gynäkologie, Berlin, October 27, 1893, the subsequent history of a patient upon whom, in November, 1891, he had performed vagino-fixation. The patient recovered perfectly from the operation, conceived one month later, and was delivered of a healthy child. During the pregnancy the uterus remained in a state of normal anteflexion, and the period of gestation was in every way uneventful. Examination after delivery showed the uterus in a state of physiological atrophy, small, anteflexed, and perfectly movable.

A Case of Self-Abortion.

Goenner (*Centralblatt für Gynäkologie*, 1894, No. 3) reports a case of a woman, thirty-seven years old, who had given birth to four children at term, and committed abortion on herself three times. Believing herself to be pregnant she inserted an elastic catheter into the vagina. The operation caused considerable pain, and on withdrawing the catheter some hemorrhage occurred. It was also found that a part of the catheter remained behind. An attack of peritonitis followed, and abortion occurred five days after the insertion of the instrument. Six days later, during defecation, the patient was seized with severe pain in the lower part of the abdomen and ileo-cæcal region. No trace of the piece of the catheter could be found by palpation, and operative procedures were considered, when the fragment was passed in a fecal evacuation. No trace of a puncture of the vagina could be found. The patient eventually recovered.

The Crochet in Neglected Shoulder Presentations.

Heinricius (*Nouvelles Archives d'Obstétrique et de Gynécologie*, 1893, No. 7) reports his experiences with Braun's crochet as follows: He considers the instrument to have many advantages. Cutting instruments are dangerous by reason of the facility with which they can wound the uterus and the surgeon. Those in the form of scissors, render the decapitation relatively longer, and one can easily cut the fingers of the hand which exercises traction on the neck. Ecraseurs, articulated saws, and other similar instruments are too complicated, and it is difficult or impossible to apply them. This crochet of Braun is simple, solid, cheap, easy to clean, and without danger to the patient; ordinarily easy to apply and rapid in execution.

The author also includes an accurate description of the instrument.

Parturition in Young Women.

Munder (*Archiv für Gynäkologie*) records his investigations conducted in the Frauenklinik at Bern, from 1872 to 1891, upon the proportion of births occurring in the earlier years of life, and the results of the same. 493 cases were chosen, the limit of age being twenty years. His conclusions may be summed up as follows:

1. Menstruation occurred in most cases at a somewhat earlier age than that commonly reported.
2. The greater proportion of births have a favorable ending.
3. Generally contracted pelves are more frequent in the earlier years, and it is concluded that frequently the bony pelvis is fully developed about the twentieth year.
4. Vertex and face presentations are more frequent, pelvic presentations more rarely seen than in general.
5. The average duration of the period of birth is from two to three hours longer in primiparæ, and decreases gradually toward the twentieth year.
6. Eclampsia, weak pains, and other complications the author finds are not more frequent in primiparæ, and he does not find the forceps more fre-

quently needed; on the other hand, however, perforation was necessary more often, on account of the greater frequency of generally contracted pelves.

7. Lacerations of the perineum are more rare in young primiparæ because of episiotomy, the gradual advancement of the birth, and the greater elasticity of the soft parts of the birth canal. This is plain when contrasted with the condition in old primiparæ. Episiotomy is necessary generally in very young primiparæ with narrow rima.

8. The number of female births was found to be relatively greater than of male.

9. The younger the mother, on the average, the smaller the child.

10. Premature births occurred most frequently when the mother was young.

11 and 12. The proportion of living children was favorable, and the course of the puerperal period good, when the mother was very young.

The Origin of Puerperal Osteomalacia.

Löhlein (*Centralblatt für Gynäkologie*, 1894, No. 1), after reference to the teachings of Kehrer regarding the parasitic origin of puerperal osteomalacia, inclines to the opinion that the disease may originate through the operations of the bacteria of bone-pus, and relates a clinical case of a woman in her fourth pregnancy who had suffered relapses of the disease after each gestation. Warm salt baths and cod-liver oil had been tried without avail, and finally Porro's operation was done in her behalf. During the operation a piece of bone the size of a bean was excised from the right iliac crest, which was much softened; it was placed in meat peptone-glycerin agar for cultures. The plate was incubated at a temperature of 37° C., and remained sterile, while two control plates of the same culture media inoculated with pus showed plentiful colonies of staphylococci after forty-eight hours.

Microscopical investigation made on sound sections of the somewhat atrophied ovaries gave negative results. Stainings with Gram-Weigert, Löffler's methyl-blue, carbol-fuchsin, showed micro-organisms to be present. The patient seemed but slightly benefited by the operation, and could walk but feebly at the end of the fourth week, the pain continuing. The author agrees with Winckel in believing that the period of convalescence of these cases requires at least one year.

The Development of the Pelvis in Both Sexes.

Konikow (*Archiv für Gynäkologie*, Band xliv., Heft 1) has made the development of the pelvis of both sexes the subject of an exhaustive series of measurements extending from birth to the twentieth year. His investigations were carried on in the Geburtshülflich-Gynäkologischen Klinik at Bern. After reviewing the opinions of Duncan, Schroeder, Fassbender, and many others, he concludes that every period of life has its peculiar and appropriate force, which affects the development of the pelvis, and that the forces vary in grade and strength in each period of life so as to be easily recognized.

During the first period, in which he classes children of both sexes from birth to the end of the fifth year, the greatest influence is the internal energy of joint growth, and no pressure is exercised upon the sacrum. From the second to the fifth year this pressure of the body weight on the sacrum first appears,

but until the tenth year remains influenced by external conditions. From the tenth to the eleventh year the pelves of both sexes exist under the same influences, and in the sexual sense there is little difference between them. First, during the tenth or eleventh year, the female pelvis begins to prepare for its future task, and is gradually made greater than the male in all its dimensions. At the time of the beginning of ovulation and menstruation it can be easily distinguished from the male.

At the nineteenth or twentieth year the male pelvis is equal or greater than the female in the transverse diameter, but the latter has much the greater measurement in the diagonal conjugate.

The Vaginal Secretion of Pregnant Women.

König (*Centralblatt für Gynäkologie*, 1894, No. 1) after reference to the investigations of Döderlein, Winter, Steffek, and others, who claimed to have found pathogenic micrococci, particularly the staphylococcus albus and aureus, as well as other pus-producing microbes, in the vaginal secretion of women after labor, relates the results of his own experience in one hundred cases of women aseptic at the period of labor. He claims to have found in the lochia the streptococcus most frequently, and but seldom the staphylococcus aureus, and never the staphylococcus albus. After considering minutely the reaction of the vaginal secretion, which in three hundred pregnant women he found to be distinctly acid, he concludes that in pathological conditions the secretions attain a much higher degree of acidity, so that the streptococcus pyogenes can hardly thrive therein; at least he was unable to obtain cultures of this germ. The author further concludes that the vaginal secretion of every untouched pregnant woman contains nothing pathogenic, the thrush or gonococcus germ excepted. Both are bacteria which upon the usual media of culture are aërobic at the body temperature. The vagina of every untouched pregnant patient is therefore aseptic.

Vaginal injections of antiseptics he considers dangerous in the ordinary patient, as they may chemically lessen the resistance of the tissues to bacteria, and may increase the intensity of septic endometritis by washing bacteria into the uterine cavity.

GYNECOLOGY.

UNDER THE CHARGE OF

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Infusion of Salt Solution in Intra-peritoneal Hemorrhage.

Dührssen (*Deutsche med. Wochenschrift*, 1894, Nos. 2 and 3) claims that in cases of intra-peritoneal hemorrhage from ruptured ectopic gestation, before the abdominal cavity is opened, a subcutaneous injection of salt solution will, as a rule, promptly revive the patient, so that abdominal section can be

performed. If neither the injection nor the intra-venous infusion of saline solution improves her condition, cœliotomy offers no prospect of cure. The writer uses an ordinary irrigator and aspirating-needle, and injects as much as a litre of the solution between the shoulders. He reports nine cases of cœliotomy for ruptured tubal pregnancy with one death, and refers to twenty others in which Gusserow operated with only two deaths.

Results of Removal of the Adnexa.

Schauta (*Deutsche med. Wochenschrift*, 1894, No. 5) reports 216 cases, with a mortality of 6 per cent., two deaths being from pneumonia. In 144 cases no pus at all (or else sterile), was found in the tubes; in 73 it was sterile, contained no streptococci. In the former the mortality was only 2.8 per cent., in the latter 9 per cent. In 15 cases pus tubes were removed containing staphylococci, with a mortality of 20 per cent. The after-histories of 121 patients were obtained, from which it appeared that 100 were in perfect health, free from pain, with no return of the menses in most cases, and able to attend to their work; 17 patients were relieved, but had occasional pains and irregular hemorrhages. The writer infers from these facts that it is not proper to class all operations for removal of the adnexa under one category, since they differ widely according to the contents of the tubes. It is fair to infer that the results of the operation will be still better in the future.

Ovarian Cysts communicating with the Rectum.

Cripps (*Brit. Med. Journ.*, Feb. 10, 1894) met with four instances of this complication in one hundred cases of ovariotomy. In discussing the question of treatment, he calls attention to the difficulty of diagnosis, where it was not positively known beforehand that a cyst was present. When there is a distinct swelling in the posterior vaginal fornix in connection with a rectal fistula, it seems preferable to puncture and drain *per vaginam*, as was done successfully in his first case. In two others, since the fistula could not be reached per rectum, it was deemed best to open the abdomen, and to reach and suture the opening from above, which was effected with success. In the fourth case (fatal), a broad-ligament cyst communicated with the rectum, and was drained through the lower angle of the wound. The writer properly states that it would have been preferable to unite the edges of the broad ligament and to have drained the cavity left after enucleation of the cyst into the rectum.

Glandular Elements in Fibro-myomata.

Schottländer (*Zeitschrift für Geb. und Gyn.*, Bd. xxvii.) found in an isolated fibro-myomatous nodule, situated on the exterior of a larger growth, glandular formations, closely resembling the glands of the endometrium, while the tissue in their immediate vicinity presented the same structure as the submucosa. The writer explains the presence of these glands on the theory that when a myoma develops in the uterine wall it acts as an irritant both to the endometrium and to its glands; the latter proliferate and extend from their original site to the tumor. It may be that small subperitoneal myomata were

originally submucous, and that endometritis may be the initial factor in the causation of these as well as of the larger tumors.

Surgical Treatment of Pruritus Vulvæ.

Sänger (*Centralblatt für Gynäkologie*, 1894, No. 7) concludes an extended article on the subject of *vulvitis pruriginosa* as follows: 1. In intractable cases of pruritus vulvæ, partial or total excision of the vulva is a justifiable operation. 2. The removal of the glans clitoridis and prepuce in older women is a proper procedure, since the changes in the nerve-endings due to the disease are such as to destroy the ordinary sexual irritability. 3. In younger subjects, and when the disease is more limited, a partial operation should be done. 4. In older patients, where the affected surface is extensive, the entire vulva should be excised, and the gap closed by a plastic operation.

Aluminol in Gynecology.

Heinze and Liebrecht (*Berliner klin. Wochenschrift*, 1892, No. 46) commend highly this new salt of aluminium as a combined astringent and antiseptic, especially when injected into abscess cavities, which rapidly diminish in size under its use. In gonorrhœal endometritis it acts well, destroying the cocci in the depths of the tissues, when used in pencils (2 to 5 per cent.); in a strength of 10 to 20 per cent. it has a decided caustic action. It is also a valuable remedy in non-specific vaginitis when used in ½ or 1 per cent. solution.

Vaginal Hysterectomy for Disease of the Adnexa.

Segond reports twenty-two operations during 1893, without a death; in four cases there were purulent foci in the pelvis, in six uterine fibroids as well as double salpingitis. The steps of the operation, as he performs it, are as follows: 1. Curettage after dilatation of the cervical canal. 2. Circular incision of the vaginal fornix and dissection of the cervix as high as the peritoneum in front and behind. 3. Clamping and separation of the bases of the broad ligaments. 4. Median section of the uterus and delivery of each half by forcible traction with volsellæ. 5. Clamping and division of the upper portions of the broad ligaments. 6. Tamponade of the vagina with iodoform gauze. The operation is simple and bloodless; the forceps (from four to six in number) are removed at the end of forty-eight hours.

Treatment of Large Vesico-vaginal Fistulæ.

Mackenrodt (*Centralblatt für Gynäkologie*, 1894, No. 8) describes his method of dealing with large fistulæ as follows: The anterior vaginal wall is put on the stretch by traction on the portio and the urethro-vaginal septum below the fistula, any cicatricial bands being divided. The bladder is also dissected off from the uterus as high as possible. A median incision is made through the vaginal mucosa, between these two points, and in a line with the middle of the fistula; the edges of the latter are then split and the anterior vaginal wall is dissected off from the bladder as in vaginal fixation

of the uterus. The edge of the fistula is denuded, and the opening in the bladder is closed with sutures of silkworm-gut; if necessary a second layer can be introduced in order to fold-in the redundant bladder wall. The corresponding edges of the vaginal opening are then denuded, the fundus uteri is drawn downward as in vaginal fixation, and is united to the flaps of the vaginal wound, thus blocking the opening.

The after-treatment consists simply in vaginal douches, the patient being allowed to pass her urine if she can. The sutures in the bladder come away of themselves without causing any irritation; the vaginal wound heals rapidly by granulation. The same method is followed in the case of utero-vesico-vaginal fistulæ, the opening in the uterus being closed by catgut sutures after the bladder has been dissected away.

The writer proposes this operation as a substitute for the more severe abdominal method of closing complicated fistulæ, or for colpocleisis, and believes that with it no case should be regarded as incurable.

PÆDIATRICS.

UNDER THE CHARGE OF

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ASSISTED BY

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INDICANURIA IN CHILDREN; ITS VALUE AS A SIGN OF TUBERCULOSIS.

SEVERAL months ago (*American Journal of the Medical Sciences*, July, 1893, p. 123) we gave an abstract of the study of Voûte, of Amsterdam (*Revue mens. des Maladies de l'Enfance*, 1893, p. 49), upon this subject, to which attention is again called by a very recent paper by MLLE. LIOUBITZA DJOURITCH *Revue mens. des Maladies de l'Enfance*, February, 1894, p. 49). After reviewing the studies of Hochsinger and Kahane, and the opposing results of Steffen, Voûte, and Carlo Giarre—to all of which, except the last, reference has been made in the abstract of Voûte's paper—the author proceeds to give the results of her own study on the subject. She criticises the conclusions reached by Steffen, by using Jaffé's method, as imperfect, for the reason that when there is in the specimen of urine a very small quantity of indican, a slight excess of the solution of calcium chloride destroys a part of the coloring matter, possibly enough to make the test appear negative; and moreover, when a fresh specimen is treated by this method a series of organic and inorganic compounds are produced by the addition of chloroform, resulting in a clouded emulsion of a very pale blue or a reddish-violet tint that cannot be determined by colorimetric tests. The test adopted for the investigation

was as follows: Equal parts of urine and hydrochloric acid are mixed in a test-tube, and then chloroform added and the mixture shaken for a moment. The presence of indican is shown by a violet coloration of the chloroform, the intensity varying according to the proportion of indican present.

Fifty-one cases were examined, and with each subject the examination was repeated several times. The absence of indicanuria in healthy children was confirmed. Its presence was detected, but inconstantly, in the following affections: typhoid fever, perityphlitis, chronic gastro-intestinal dyspepsia, bronchitis, pneumonia, pleurisy, and grave chorea. In the acute diseases above mentioned indicanuria existed very markedly during the febrile stage, but disappeared at the moment of defervescence, and did not reappear during convalescence. In tuberculosis, on the contrary, the presence of indican was constant: in one case of a little girl, rhachitic and tuberculous, it was found in decided quantity at every daily examination for a month preceding death. In another observation (pulmonary tuberculosis and purulent pleurisy in a child of two years) the daily quantity varied, but it was never entirely absent.

The conclusions from the study are given as follows:

1. Indican exists in normal state in the urine, but in so small a quantity that indicanuria must be considered as a pathological phenomenon, especially with children whose diet is less nitrogenous than that of adults.

2. Indican being a derivative of indol, indicanuria will be especially accentuated in diseases accompanied by an over-production of indol.

3. This over-production is especially encountered in acute and chronic diseases of the digestive tract.

4. Indicanuria is constant and permanent in tuberculosis, according to the author's experiments. It seems, therefore, that there exists a direct relationship between indicanuria and tuberculosis.

5. The explanation of indicanuria in tuberculosis is difficult when there exist no digestive troubles. Up to a certain point it can be explained by the profound depression of general nutrition manifested in the course of tuberculosis.

Some Fatal After-effects of Chloroform on Children.

Leonard G. Guthrie (*Lancet*, January 27, 1894, p. 193) makes some valuable observations under this heading. As a rule, he says, children pass from chloroform narcosis into a condition of deep natural sleep, which lasts for an hour or more unless disturbed by pain or vomiting. No attempt to rouse the patient should be made unless collapse is present, or the breathing becomes stertorous and the face dusky. He should be put to bed with as little disturbance as possible. The bed should be previously warmed by hot-water bottles. The room should be kept quiet, dark, and cool. The patient's head should be turned on one side on a low pillow, and he should be carefully watched, for accidents—such as the entry of vomit, or falling back of the tongue into the glottis—are as likely to happen now as during the operation. . . . Vomiting, though usual, is not invariable. Some children, even after prolonged operations, vomit little or not at all, and as soon as awake they begin to clamor for food. . . . Vomiting, unless frequent, persistent, and exhausting, after six or eight hours have elapsed, need not be checked

by drugs. Simple remedies, such as sipping very hot water out of a feeder or sucking small pieces of ice, which most children like, usually suffice. . . . If, after from six to eight hours, vomiting shows no tendency to subside, and no nourishment can be kept down, it is necessary to feed by nutritive enemata. . . . The common formula used is half a drachm to one drachm of strong meat essence and the same quantity of brandy, with a raw egg beaten up in half an ounce of peptonized milk. . . . Children often on regaining consciousness commence to utter piercing cries, and continue to do so for many hours. In many cases this is due to pain, or to a tight bandage, or to a constrained position; but often no obvious cause can be detected. . . . Occasionally screaming and vomiting become symptoms of the gravest import. Ten such cases are discussed in this paper. The condition in these cases resembles that of acute delirious mania. Shrill, piercing screams are uttered at short intervals. The eyes are dry, the pupils often dilated; the face is sometimes flushed, sometimes pale, and has a look of wild terror and anxiety. There are almost always great restlessness and sleeplessness, the patient tossing and struggling. Consciousness is sometimes lost early, and in some cases is never regained; but, as a rule, there are intervals in which the child appears to be dull and apathetic, yet answers rationally and denies pain. Sometimes, also, in the height of excitement it may be soothed for a time, but the screaming will soon recommence. Headache does not seem to be present. Grating of the teeth has occasionally been observed, and in one case the pupils were unequal shortly before death. Strabismus has been absent. Vomiting of an extremely violent, copious, and persistent type is an all but invariable symptom. Not only is food given by the mouth almost immediately returned, but the vomiting occurs when the patient is fed entirely by the rectum. The vomit at first, when the stomach is empty of food and when there are intervals in the attacks of vomiting, is clear or yellowish, but usually exactly resembles the dregs of beef-tea, and answers to Gmelin's test for bile. . . . The temperature generally falls to 97° or 98° F. immediately after the operation. A temperature of from 95.8° to 96° was noted in only one case, and this was the only one of the ten that recovered. The temperature usually undergoes several moderate rises and falls, and is commonly above normal at death. In one case it rose to 103° four hours after operation and remained so throughout. Death, as a rule, is owing to gradual exhaustion; the screams become less powerful and are uttered at longer intervals; the vomiting is less violent; unconsciousness leads to coma; respiration and pulse gradually fail, the latter often being imperceptible for a considerable time before the breathing ceases.

The Action of Light upon the Klebs-Löffler Bacillus.

An important bacteriological study upon this subject by Ledoux-Ledard (*Revue mens. des Maladies de l'Enfance*, February, 1894, p. 66) leads him to the following conclusions:

The action of diffused light does not prevent the development of cultures of diphtheria either at 90° to 95° F. or at ordinary temperatures. Sunlight arrests this development and sterilizes bouillon cultures in several days.

Diffused light has no bactericidal power over the bacillus in dilution in

neutral bouillon; but, on the contrary, this power is great in dilutions in distilled water, the latter acting in the same way as light, and the destructive action upon the bacillus being the resultant of the two concordant actions.

Diffused light destroys dry cultures of the bacillus, when exposed in thin films, in less than two days (twenty-four hours of exposure to the light). Direct sunlight acts in the same way, but with greater rapidity.

This bactericidal power of light toward the bacillus of diphtheria is due almost exclusively to the rays of greatest refraction; rays at the other extremity of the spectrum have little or scarcely any power. Light, therefore, is to this extent a prophylactic against diphtheria.

In exposed diphtheritic false membranes light does not reach the bacilli until it has lost all or part of its intensity, hence they preserve their vitality and virulence for a long time.

Light can be utilized in the disinfection of places infected with diphtheria, but only as an auxiliary to more certain disinfectants.

Scurvy in Children.

At a stated meeting of the New York Academy of Medicine, February 15th, Dr. W. P. Northrup (*Archives of Pediatrics*, March, 1894, p. 227) read the paper on this subject. The disease is described as a condition of malnutrition which affects the capillaries, allowing the blood to escape from the vessels, producing gingivitis or spongy gums, and various hemorrhages. The collections of blood in the tissues are most apt to be about the shaft of the femur and beneath the periosteum, and into the skin, forming spots of ecchymosis or petechiæ. Epistaxis and hemorrhages from other mucous membranes are not uncommon. There is also anæmia, and points of tenderness, notably about the swollen limbs. Dr. Northrup had succeeded in collecting eleven cases of infantile scurvy from American practice. On analysis all gave the same history—feeding on proprietary food, feeding by paid nurse, or on food consisting of condensed milk. In one case scraped meat had been advised by a physician for persistent diarrhœa, and as the baby got well on this diet the parents continued it for months, with the result of developing scurvy. The disease is more apt to occur among the well-to-do, for the reason that they are better able to pay for proprietary foods, and their children are less likely than those of the poor to have the freedom of the table. Statistics showed that the age at which the disease was found most typical was the second year. Scurvy is frequently associated with or superadded to rickets. The treatment is orange-juice and other fresh fruits, with change and regulation of the diet.

Dr. H. L. Taylor continued the discussion by describing a case which had been referred to in Dr. Northrup's paper. The child was eleven months old, and had been fed exclusively on a special brand of condensed milk. She had seemed to thrive on this food up to the age of six or seven months, when it was noticed that she could not sit up as she had done before. The other typical symptoms soon became manifest. A point in differential diagnosis was the fact that there was no local elevation of temperature in the swollen thighs, as would be the case with rheumatism and other inflammations.

Dr. Louis Starr, of Philadelphia, in a communication, stated that he

had seen thirteen cases of infantile scurvy, nine of them since 1891. Immobility and excessive tenderness of the lower limbs, with swelling most pronounced in the neighborhood of the joints; spongy gums, and sometimes hemorrhages, were the most characteristic symptoms. All his cases recovered under proper dietetic treatment, together with orange-juice. Several of his cases he attributed to the use of sterilized milk, from the fact that these children recovered as soon as the administration of this milk was discontinued. For such cases the milk may be Pasteurized but not sterilized at high temperature.

Dr. T. M. Rotch, of Boston, had seen about twenty cases in recent years.

Dr. F. Forchheimer, of Cincinnati, wrote that in one of his cases the peculiar complexion lasted eighteen months after recovery. He thought that the disease was probably due to some chemical change in the blood, one which could be corrected by fruit juice and change of food. He had seen ten cases.

Dr. A. Jacobi confirmed the view that sterilized milk was capable of causing the disease. He had seen scurvy in one baby of four months, in one of six months, and in a third of six weeks, and while two of them had not spongy gums, one, the baby of six months, but without teeth, did have spongy gums. He also advocated phosphorus, say ten to fifteen minims a day of the elixir phosphori, in addition to the dietetic treatment.

Dr. L. Emmett Holt stated that in five of the six cases seen by him the disease had developed from the exclusive use of a well-known proprietary food. He thought these foods were employed more in the country than in the city.

Dr. W. L. Carr had found scurvy rare in New York institutions. He had seen three cases in private practice. In one of the worst there was no gingivitis, but there had been diarrhœa. In this case there was also swelling of the forearms, but much less marked than that of the lower extremities.

Dr. J. E. Winters said that one of the worst cases of scurvy he had ever seen was in a baby which had been fed exclusively on a proprietary food from birth; a very prompt and thorough recovery took place on no other treatment than the substitution of sterilized milk. In the several cases seen by him recently, the same treatment had been employed with like success, namely, giving sterilized milk. The one mistake in sterilizing milk consisted in sterilizing it too long; the process should never go beyond twenty minutes.

Acute Intussusception in Children.

Arthur E. J. Barker, F.R.C.S. (*British Medical Journal*, February 17, 1894, p. 345) reports seven cases of acute intussusception in children, with details of treatment. His conclusions, founded upon the results of his experience and study, are as follows: 1. That in all cases of intussusception in children, injection of water or manipulation should be at once resorted to if the patient is seen within a few hours of the onset of the strangulation.

2. That if these means fail after a fair trial, not too much prolonged, laparotomy should be at once done as the safest treatment.

3. That there is a certain proportion of cases among all the varieties of intussusception which no amount of injection will relieve, or in which injection would be dangerous, and these can only be dealt with by opening the abdomen.

"Anorexia Nervosa."

W. J. Collins (*Lancet*, January 27, 1894, p. 202) adds an interesting case to those already reported under this heading by the late Sir William Gull (*Lancet*, October 22, 1892, and *Transactions of Clinical Society*, 1874, vol. vii.). A girl, seven and a half years old, of healthy ancestry, had for ten weeks prior to her admission to the London Temperance Hospital persistently refused food and had only partaken of very small quantities after much coaxing. Latterly she had remained at home, lying doubled-up in bed, an object of compassion to her friends and neighbors. On admission to the hospital her skin was dirty, and she was infested with pediculi; the emaciation was extreme. The legs and thighs were rigidly flexed, and any manipulation evoked tenderness and tears. The joints, however, were unaffected, and reflexes normal. Her weight was thirty-three pounds. All the organs and excretions were normal, but some defined swelling and tenderness were noticeable over the outer part of the left thigh, which subsequently developed into an abscess. More remarkable, however, were the mental phenomena. She was reported to be very deceitful and intensely selfish; she took no notice of other children in the ward, was self-absorbed, very vain, and "told long stories of other people who had been ill just like her, and what terrible things happened to them." She asked for the Bible, as she cared for no other book, and she was effusively pious in conversation, though she used foul language to the nurses and was filthy in her habits.

Under careful feeding, cod-liver oil, and massage, her condition immediately began to improve, and with increasing weight and the restored use of her limbs her mental and moral state completely changed. After two months of treatment she weighed forty-four pounds, and the last report was that "she played with the other children, seemed interested in everything in the ward, and was easily manageable."

Lasègue refers to a similar condition under the term *anorexie hystérique*.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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Immunity: Typhoid Fever, Diphtheria, Tuberculosis, Pyogenic Micrococci.

In our somewhat disconnected review of the facts thus far developed in support of the "antitoxin theory" of immunity, we have discussed the evidence offered by the study of tetanus, diphtheria, pneumonia, hydrophobia, and glanders, and have found much support for the theory from a consider-

ation of experimentally induced immunity in animals, and from the analysis of cases of these diseases in man which have been treated, in accordance with this theory, with the blood serum of artificially immunized animals, or with the specific antitoxins which had been prepared therefrom. We have now to consider the additional evidence afforded by the study of typhoid fever, tuberculosis, and the pyogenic micrococci.

It will be remembered that in our notice of the experiments of the brothers Klemperer upon the artificial induction of immunity to pneumonia, mention was made of the fact that they had succeeded in producing immunity in rabbits by the introduction of the blood serum of patients convalescent from that disease, and that in our review of the therapeutic value of the blood-serum treatment of pneumonia it was stated that Neisser had treated pneumonia patients with apparent success with the serum of other patients convalescent from the same disease. Stimulated by these results, STERN has similarly experimented with the blood serum of six convalescents from *typhoid fever*, and of a seventh patient who had recovered from a well-marked case of the disease seventeen and a half years before, as shown by the hospital records. Five of the convalescents were under treatment in two hospitals in Breslau, and could consequently be thoroughly observed. The blood serum was obtained from the convalescents on the fourth, fifth, sixth, and eighth days after the subsidence of fever, and in one case it was again obtained five and a half weeks after the commencement of convalescence. The investigation was directed to the determination of (1) the germicidal power of this blood serum, and of (2) its power to induce immunity to the ordinary effects in animals of inoculation with virulent culture of the typhoid bacillus.

The results of twenty-two carefully conducted experiments with the blood serum of five convalescents showed it to possess even lower germicidal power than the blood serum, pleuritic exudate, and ascitic transudate of persons who had not had typhoid fever.

On the other hand, its protective or immunizing power was great; for virulent cultures, when treated with the blood serum of convalescents, became innocuous or of much lessened virulence when inoculated into mice, in five of six cases studied. This is explained on the theory that the noxious effects in animals of inoculations of typhoid bacilli are due to the toxins of that germ, not to the presence of the germ itself; and this theory is in turn borne out by the fact that the same effects resulted in Stern's experiments whether the germs were killed before inoculation of a beef-tea culture or not. In both cases the addition to the bouillon of the blood serum of convalescents from typhoid fever before inoculation deprived it of its noxious action.

These facts are believed by Stern to be explicable only on the theory of an antitoxic action of the blood serum of convalescents. But whether this antitoxic action depends upon direct chemical combination of its ingredients with the toxins of the disease, thereby depriving them of their poisonous qualities, or upon the stimulation by those ingredients to a greater power of resistance on the part of the tissues, he finds it impossible to decide.

Almost simultaneously with these experiments of Stern, it was discovered by PETRUSCHKY, in the course of some experiments relative to the nature of the pathogenic action of typhoid bacilli in animals, that the resistance of animals which had withstood an inoculation with the germs was much in-

creased as compared with that of other animals, which had not previously received the inoculation, and that a dose which at first produced pronounced symptoms failed to do so on a subsequent inoculation.

These results have in turn been indirectly confirmed by BITTER, who succeeded in establishing immunity in rabbits to large doses of the toxins of typhoid bacilli by repeated injections of small but constantly increasing doses of filtered glycerin-bouillon cultures of that germ. Animals thus treated withstood doses which killed other rabbits in from eight to twelve hours. The blood serum of animals thus immunized, when mixed with solutions of the typhoid toxins, deprived them of their toxic action, making them harmless in otherwise uniformly fatal doses.

By a similar though slightly different method, CHANTEMESSE and WIDAL have also succeeded in producing immunity in rabbits to typhoid fever. Their cultures before injection were attenuated by boiling. These sterile cultures, when injected in gradually increasing dose, conferred immunity both to the living germ and to its toxins. They further state that the serum of animals thus immunized possesses decided curative power when injected into animals within six hours after inoculation with a virulent culture, and that the serum of patients convalescent from typhoid both immunized and cured rabbits. This power was shown to be possessed by the blood of six convalescents from typhoid fever.

Continuing these studies, Chantemesse and Widal tested the curative power in man of the serum of immunized animals. Two patients received injections of the serum on the tenth and eleventh days of the disease respectively. In both cases the temperature fell, but again rose in a few hours, and the course of the disease was uninterrupted. But little was to be expected from these tests in the way of proof of the efficacy of the treatment, for in the first case the amount injected was admittedly too small—only 25 c.c. in all—and in both the treatment was instituted too late in the course of the disease to influence it materially.

Quite independently of Chantemesse and Widal, but following a suggestion of Stern, HAMMERSCHLAG treated five typhoid-fever patients with the serum of convalescents from that disease. In the first cases the serum alone was used, but in the later ones the whole blood was injected in doses of from 40 to 80 c.c. In the first three experiments no result was observed to follow the injections. In the fourth the temperature fell rapidly without collapse, but rose again in the course of about twenty hours. In the fifth case, also, there was a fall of temperature, but its cause was uncertain, as hemorrhage from the bowels occurred at the same time. It should, however, be noted that there was no accompanying collapse, and that a subsequent hemorrhage was not attended by fall of temperature. The course of the disease was apparently unaffected in both these cases.

On the whole, these therapeutic tests must be considered as quite inconclusive, though demonstrating the harmlessness of such treatment.

Results similar to those of Stern have been recently reported by KLEMENSIEWICZ and ESCHERICH as regards *diphtheria*. Blood was obtained by venesection from two patients on the fourteenth and ninth days, respectively, of convalescence from diphtheria. Its serum was shown to possess a marked protective quality when injected into guinea-pigs twenty-four hours before

inoculation with a virulent culture of the diphtheria bacillus. Animals thus treated remained healthy after inoculation with cultures which killed guinea-pigs not thus treated in from thirty to thirty-six hours. This protective action was found to have disappeared in the course of two weeks, the animals after that interval succumbing to the inoculation. Control experiments with the serum of persons who had not had diphtheria showed it to possess no similar protective quality.

Early in 1892, TIZZONI and CENTANNI published the results of experiments directed to determining the power of Koch's tuberculin to protect animals against inoculation with *tuberculosis*, as the result of which they are led to believe that a measure of immunity to that disease may be thus induced.

Animals which had received injections of tuberculin for some time prior to inoculation were found to be much more resistant than animals not so treated; they often remained in good general condition notwithstanding the development of a pronounced local lesion at the point of inoculation, and after killing the animals there was usually found to be no widespread distribution of the tubercular lesions, as was always the case in the control animals similarly inoculated. As the experiments were made with guinea-pigs, the most susceptible of animals to tuberculosis, it would not be unreasonable to expect even more striking results with other less susceptible species. Tizzoni and Centanni attribute this protective action to the formation of antitoxins in the blood as the result of the tuberculin injections.

HÉRICOURT and RICHET have also succeeded in immunizing animals to tuberculosis, but in a somewhat different way.

It has been demonstrated by a number of observers, including Koch himself, that the spontaneous tuberculosis of fowls is caused by a bacillus closely resembling the bacillus tuberculosis of man, but differing from it in a few important details, more particularly as regards its virulence in animals. It is therefore regarded as a variety of the tubercle bacillus. Héricourt and Richet succeeded in immunizing dogs to the bacillus tuberculosis of man by inoculations with bird-tuberculosis. The ten animals so treated withstood the more virulent variety, gaining in weight and giving every indication of perfect health, whilst six control dogs, not so treated, succumbed to the disease.

But little has as yet been accomplished in the study of immunity to the ordinary pyogenic micrococci, the *staphylococcus pyogenes aureus* and the *streptococcus pyogenes*.

In 1891, RODET and COURMONT succeeded in separating two substances, quite distinct from one another, from pure cultures of *staphylococcus* by precipitation with alcohol. One, soluble in alcohol, was found by experiment to intensify the effect of inoculations of the staphylococcus; the other, insoluble, was found to have a protective action. The noxious substance was found to be more abundant in the cultures, which is believed to account for the non-action of the protective substance when both are simultaneously introduced with a culture. The noxious substance is, however, more susceptible to heat, for by heating cultures for twenty-four hours at 55° C. it lost its activity, and such cultures were found to be protective.

The generalization of the authors, that similar antagonistic substances are produced in pure cultures of all bacteria and that the deleterious substance

is always the more vulnerable, seems hardly warranted. They are hopeful that protective effects may be obtained in many diseases by the injection of cultures attenuated by heat.

Results similar to those of Rodet and Courmont have been obtained by ROGER.

Pursuing this subject still further, MIRONOFF, after confirming the results of Roger, has succeeded in transferring immunity from one animal to another by injections of its blood serum. The immunity obtained by attenuated cultures and by this method were found to be identical. Neither are complete, but the animals were shown to be able to withstand inoculations of from five to ten times greater amount than before, and local changes occur at the point of inoculation even then. The serum of immunized animals possessed no germicidal quality, but was shown to have a decided curative effect upon animals suffering from streptococcus septicæmia, the degree of the benefit being directly proportional to the degree of immunity of the animal from which the serum was obtained and to the amount of it injected.

We see, then, that the study of typhoid fever, tuberculosis, and the pyogenic micrococci has added to the evidence already adduced in support of the antitoxin theory of immunity. The facts, when not directly contributing to that theory, are still in accord with it. Something inimical to the pathogenic action of their respective germs has been shown to exist in the blood of convalescents from typhoid fever and diphtheria, self-limited diseases, and in pure cultures of the pyogenic cocci, and antitoxins are believed to have been produced in the body by injections of the toxins of tuberculosis. And, furthermore, in all these diseases, except tuberculosis, the blood of immunized animals has been proved to possess immunizing power, though not endowed with any germicidal action. The failure of Chantemesse and Widal and of Hammerschlag to cure typhoid-fever patients with injections of the blood of convalescents should not be accorded too much weight as militating against the antitoxin theory. Only a few injections were given in each case, and the doses were small, whereas it has been demonstrated by animal experiments that much larger doses are necessary to cure than to produce immunity. Furthermore, the experiments of Chantemesse and Widal on animals showed the necessity of early exhibition of the curative injections, and this cannot be said to have been done in any of the cases treated.

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